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Empirical Selection and Individual Differences Multidimensional Scaling of Adjectives Denoting Feelings.

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EMPIRICAL SELECTION AND INDIVIDUAL DIFFERENCES MULTIDIMENSIONAL SCALING OF ADJECTIVES DENOTING FEELINGS

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ABSTRACT

Interest in feelings has persisted in psychology despite periods of almost total eclipse from the time of Darwin and Wundt. Two traditions of investigation--one dealing with facial expression and the other with self-report--have come to quite different conclusions about the dimensionality and structure of the domain: the former finding two or three dimensions; the latter, from five to ten. The present research attempted to develop an independent line of evidence on dimensionality and structure and consisted of two studies dealing with empirical selection and multidimensional scaling of adjectives denoting feelings. In the first study, 723 college students, heterogeneous with respect to race, sex, and grade, from four universities, judged whether each of 2186 adjectives most denoted behavior, "how a person acts"; personality, "what a person is like"; or feelings, "what a person feels." Each subject judged 200 adjectives; the number of observations per adjective ranged from 58 to 100. No evidence for the effects of race, sex, or grade on judgments of feelings was found, so the proportion of subjects judging each adjective to denote feelings was used directly as the least squares estimate of consensus in the population. Two hundred sixty-four adjectives whose consensus values exceeded .5 and whose 95% confidence intervals excluded .49 were accepted as

denoting feelings.

In the second study, a multidimensional scale of adjectives denoting feelings (MDSADF) was constructed by the Individual Differences Multidimensional Scaling (INDSCAL) method of J. D. Carroll and J. J. Chang from the similarities judgments of 762 college students, heterogeneous with respect to race, sex, and grade, from four universities. The INDSCAL method provides for individual differences in perception by solving simultaneously for a group perceptual space and a set of weights for each subject, expressing the relative importance each assigns to the dimensions of the space in making judgments of similarity. The 264 adjectives defined by the first study were scaled in partitions of 20 adjectives within two independent replications. Partitions were combined by least squares methods within replications to form two scales, which were correlated to provide estimates of reliability, and then combined themselves to form the MDSADF. Three replicable dimensions were found by the analysis and were interpreted as Pleasantness-Unpleasantness, Level of Activation, and Level of Aggression. They accounted for 63%, 21%, and 18% of the total variance of the scale respectively. Estimated reliabilities were .91, .63, and .36. The median correlation between scalar products predicted for each subject by the INDSCAL solution and actual scalar products was .62. Evidence for moderately large individual differences in

perception was found in the variance of subject weights. Multivariate tests of the effects of race, sex, and grade on these weights revealed a significant effect for race. The discriminant function associated with the effect suggested that white students stress the Pleasantness-Unpleasantness dimension, and to a lesser degree the Level of Activation dimension more than black students. The research as a whole supported the results obtained by investigators in the facial expression tradition.

INTRODUCTION

Interest in feelings, affects, moods, or emotional states, as this area has been variously called, has persisted in psychology despite periods of almost total eclipse from the time of Darwin (1872) and Wundt (1897). The continuity of this interest can be seen in a recent study by Ekman and Friesen (1971) which tested Darwin's hypothesis that facial expressions of emotion communicate cross-culturally. Unfortunately, a certain amount of confusion has also persisted about what constitutes the domain of feelings and how it relates to other domains. One of the basic questions from the point of view of measurement--that of dimensionality and structure--is still unanswered. Schlosberg (1952, 1954), Engen, Levy, and Schlosberg (1957, 1958), Abelson and Sermat (1962), Gladstones (1962), and Osgood (1955, 1966), working with facial expression, arrived at two or three dimensions. Nowlis and Green (1957, 1964, 1965), Borgatta (1961), Clyde (1963), McNair and Lorr (1964), Lorr, Daston, and Smith (1967), Howard and Hill (1967), Howard, Orlinsky, and Hill (1970), and Izard, Chappell, and Weaver (1970), working with self-reports of feelings, arrived at from five to ten. Both approaches resulted in relatively consistent results within each, but large discrepancies between.

The research reported here addressed itself to these

discrepancies by attempting to develop an independent line of evidence on the dimensionality and structure of feelings. It adopted an approach--multidimensional scaling of adjectives denoting feelings--which had been used only once previously, in Swedish by Ekman (1955), whose method of scaling has been shown by a number of investigators (Coombs, 1964; Kruskal, 1964; Mellinger, 1958; Shepard, 1962) to yield spuriously high estimates of dimensionality and unclear structure. The multidimensional scaling of adjectives seems particularly appropriate since it draws upon information implicit in the language used by subjects and investigators alike in identifying, reporting, or thinking about feelings.

Part I of this report reviews the studies cited above which concerned themselves with the dimensionality and structure of feelings as expressed in facial expression and self-report. Part II describes the first study in the present research which empirically selected adjectives in American English denoting feelings. Part III reports the second and principal study which constructed a multidimensional scale of adjectives denoting feelings by the Individual Differences Multidimensional Scaling (INDSCAL) method of Carroll and Chang (1970). The findings of that study are related to previous studies and some possible reasons are offered for the discrepant results of the facial expression and self-report approaches.

PART I:
REVIEW OF THE LITERATURE

Concern for the dimensionality and structure of feelings expressed in facial expression began roughly with Harold Schlosberg (1952). In a series of four experiments he had subjects rate photographs from the Frois-Whitman and Ruckmick series on two dimensions: Pleasantness-Unpleasantness and Attention-Rejection. Eight, nine, eighteen, and twenty subjects from an undergraduate course in psychology participated in the four experiments respectively. Difficulty in defining the Attention-Rejection dimension verbally on the first study led to the use of photographs as anchors in subsequent studies. The Frois-Whitman series was judged in the first three experiments; the Ruckmick series, in the last. For the last three studies anchors were drawn from the series not judged. Validity of the ratings was assessed by predicting the values for each picture on the circular Woodworth scale (Schlosberg, 1941; Woodworth, 1938) and correlating predicted and previously established values. Correlations for the four experiments were respectively .76, .94, .92, and .96.

Schlosberg (1954) proposed a modification of his two dimensional scale, adding a dimension called Level of Activation or Tension-Sleep. He reviewed a number of

physiological studies suggesting the importance of Level of Activation and reported a preliminary scaling of photographs expressing emotion using the new dimension.

Trygg Engen, Nissim Levy, and Harold Schlosberg (1958) in three experiments had subjects scale a new series of photographs of facial expression (Engen, Levy, & Schlosberg, 1957), the Lightfoot series, on three dimensions of emotion proposed by Schlosberg (1954): Pleasantness-Unpleasantness (P-U), Attention-Rejection (A-R), Sleep-Tension (S-T). In the first experiment 96 subjects judged all 48 photographs in the series on a 9-point scale. Interquartile ranges indicated highest reliability for P-U, followed by S-T and A-R. In the second experiment, six groups of 35-40 subjects judged 16 photographs from the Lightfoot series twice, separated by an interval of 45 minutes. Order of rating dimensions was varied across groups, but no order effects were found. Test-retest reliabilities were .94 for P-U, .92 for S-T, and .87 for A-R. The third experiment found support for the hypothesis that a series of photographs restricted to one end of the S-T dimension would increase variability of judged scale values on that dimension.

Robert P. Abelson and Vello Sermat (1962) performed a multidimensional scaling analysis of 13 photographs of facial expression from the Lightfoot series (Engen et al., 1957, 1958). Thirty female graduate and special students were asked to make pair-wise judgments of the dissimilarity

of the emotions expressed in the photographs, which were projected onto a screen for 6 seconds. Subjects recorded a number from 1 - 9 expressing their judgments. Three pairs of photographs, not part of the experimental series, were used to illustrate the procedure.

The method of successive intervals was used to develop a matrix of interstimulus distances. The matrix was then converted to scalar products and factored (Torgerson, 1958). Five dimensions were obtained, the first three accounting for 73% of the total variance of the scale. The unrotated dimensions were correlated with Schlosberg's scale (Engen et al., 1958; Schlosberg, 1952, 1954). Dimension 1 correlated .95 with Pleasantness-Unpleasantness; Dimension 2, .88 with Attention-Rejection and .92 with Level of Activation. Dimensions 3, 4, and 5 did not have appreciable correlations with the Schlosberg scale and attempts to interpret them were unfruitful. The proportion of variance accounted for by the first two dimensions was in the ratio 5:4. Abelson and Sermat concluded that Schlosberg's scale had substantial validity, but required only two dimensions. They expressed a slight preference for Level of Activation as the interpretation of their second dimension.

W. H. Gladstones (1962) performed a multidimensional scaling analysis of 10 photographs of facial expression selected from the Lightfoot series (Engen et al., 1957,

1958). Photographs were presented in groups of three (triads). One hundred twenty-six subjects judged which of the last two members of a triad was closer to the first in expressed emotion. All possible groups of three were formed from the 10 photographs, giving 120 triads, and expanded by rotating each member of a triad into the first position, which resulted in a total of 360. A third of the subjects judged each set of 120 triads. Relative distances were calculated by an extension of Thurstone's comparative judgment model (Torgerson, 1958) and an additive constant found by Messick and Abelson's (1956) procedure. Scalar products were calculated and factored by the principal components method.

Three dimensions emerged from the analysis. Without rotation, Dimension 1 correlated .97 with Pleasantness-Unpleasantness (Engen et al., 1958); Dimension 2, .93 and .82 with Sleep-Tension and Attention-Rejection respectively. The meaning of the third dimension was unclear but seemed to have something to do with the expressiveness of a photograph and was labeled "Expressionless-Mobile." The proportion of variance accounted for by the three dimensions was in the ratio 3:2:1.

Charles E. Osgood (1955, 1966) performed parallel analyses of data derived from an experiment on the communication of emotion via facial expression. One hundred twenty-five students in five sections of a psychology

course participated in the experiment. Ten students were selected at random in each section as actors and given a slip of paper with four emotion labels on it drawn randomly from a list of 40 labels written on the blackboard. Actors posed each emotion for 10 seconds while members of the section selected a label from the board expressing their judgment of the intended emotion. All 40 emotions were acted and judged in each section.

A matrix of judgments by intentions was constructed by counting the number of times each label was selected for each intended emotion. In his first analysis of the data, Osgood (1955) derived a measure of psychological distance between labels based on these frequencies and plotted the resulting configurations in three dimensions. He interpreted the major axes of the space as Pleasantness (glee, joy . . . sullen anger, sulkiness), Intensity (contempt, dismay . . . quiet pleasure, complacency), and Control (loathing, annoyance . . . horror, awe).

In his second analysis of the data, Osgood (1966) correlated rows of the judgment-intention matrix and factored the result by the centroid method. Twelve dimensions emerged which accounted for 84% of the variance. Varimax rotations of 12, 6, and 3 dimensions seemed to result in clusters of emotion labels which progressively coalesced as the dimensionality was reduced. The limit of this coalescence process appeared to be the first three unrotated

dimensions which accounted for 46% of the variance. Osgood interpreted these dimensions as Pleasantness (joy, glee . . . dread, anxiety), Control (annoyance, disgust . . . amazement, excitement), and Intensity (sullen anger, rage . . . complacency, adoration) respectively.

Concern for the dimensionality and structure of feelings expressed in self-report began with Vincent Nowlis and Robert F. Green (1957). They factored five sets of data derived from 12 administrations of a "mood adjective checklist" to 450 college males. The 130 word list was devised in accordance with four hypothesized bipolar dimensions of mood. Each adjective appeared as a 4-point scale: definitely does not apply, cannot decide, slightly applies, definitely applies. The checklists were administered before and after six weekly, hour-long sessions in which motion pictures, a frustrating hoax, and a contest for cash prizes were used to induce differing moods. Thirty-four variables were eliminated from the matrices before factoring on the basis of order of presentation effects, response distributions, lack of intercorrelation with other variables, and reliabilities. Three pre-session administrations were combined and factored as one set; one pre-session administration was factored alone; and three post-session administrations were factored separately. The instructions for the checklist asked subjects to describe how they felt at the moment they read each adjective.

Factors were extracted by the centroid method and rotated analytically to oblique simple structure using the Oblimax criterion. Communality estimates for two solutions began with the highest correlation in a row of the correlation matrix and were iterated once. Three solutions used the highest correlation in the matrix as a fixed estimate of communality and were not iterated. Ten factors were extracted from all matrices. Nine factors in each solution accounted for virtually all of the common variance and were retained for rotation.

The results of these analyses were 45 primary factor axes which were matched through intercorrelation across solutions. Four factors were present in all five solutions: Aggression (defiant, rebellious, angry . . .), Anxiety (clutched up, fearful, jittery . . .), Surgency (carefree, playful, witty . . .), Concentration (attentive, earnest, serious . . .). Four factors were matched across four solutions: Fatigue (drowsy, dull, sluggish . . .), Social Affection (affectionate, forgiving, kindly . . .), Sadness (regretful, sad, sorry . . .), Skepticism (dubious, skeptical, suspicious . . .). One factor, Egotism (egotistic, self-centered, aloof . . .), was found in three solutions. Two factors were found in only two solutions: Elation (elated, overjoyed, pleased . . .) and Nonchalance (leisurely, nonchalant . . .). One unmatched factor was interpreted: Vigor (active, energetic, vigorous . . .).

The relative contributions of these factors to total variance were not reported. The intercorrelations of the factors varied for each solution but all were positive, ranging from .01 to .86. The median intercorrelation considering all solutions was .46. Communalities of the variables for the five solutions ranged from .23 to .77 with a median of .46. Nowlis and Green considered one of the most striking results of these analyses the absence of bipolar factors.

Two replications of the initial series of factor analyses were carried out by Nowlis and Green (Nowlis & Green, 1964, 1965), one on a group of navy personnel and the other on a group of college women. The navy sample consisted of 163 enlisted men who were administered a 40-word checklist at the end of a routine day at New London, Conn. The list was made up of 33 adjectives best defining eight factors from the previous study, plus three new adjectives to balance the number of adjectives per factor and four to assess subjects' attitude toward the task. Factor extraction was carried out as in the previous study. Eight factors were retained for Oblimax rotation initially; then all 10 factors were rotated. Nowlis and Green reported relatively good confirmation for five of the eight previously found factors: Aggression, Anxiety, Concentration, Fatigue, and Sadness.

The college sample consisted of 165 women who took the

40-word checklist (with four words replaced by synonyms to avoid slang) after a final examination. Eighty-three of them had also filled out the checklist before the exam. Factor extraction was the same as previously, and nine factors were rotated to the Oblimax criterion. Six factors from the original study received relatively clear confirmation: Aggression, Anxiety, Concentration, Fatigue, Social Affection, and Egotism. Intercorrelations of the factors and communalities of the variables for these two replications were not reported.

Edgar F. Borgatta (1961) performed two factor analyses of a 40-word adjective checklist administered to 180 male college students before and after a period of 2½ hours spent completing personality questionnaires. The checklist was derived from one of the early factor analyses of Nowlis and Green, five adjectives for each of eight factors. (Presumably the same 4-point format was used, but this is not made explicit.) Factor extraction was accomplished by the centroid method and rotation to orthogonal simple structure by the Quartimax procedure. The method of estimating communalities was not reported. Seven factors were found in both pre-session and post-session data which appeared to replicate Nowlis and Green's early findings but which in terms of their final results were less supportive: Aggression (defiant, rebellious . . .), Anxiety (?) (shocked, startled . . .), Concentration (concentrating,

engaged in thought, earnest . . .), Fatigue (drowsy, sluggish, tired . . .), Social Affection (affectionate, forgiving, kindly . . .), Sadness (?) (insecure, blue, lonely . . .), Egotism (boastful, egotistic . . .). Relative contributions of the rotated factors to total variance were not reported. The communalities of the variables were of the same order of magnitude as those in the Nowlis and Green analyses.

Robert E. Thayer (1967) factored a set of 28 adjectives relating to a hypothetical activation continuum and 21 general "mood" adjectives. They were presented in the 4-point Nowlis format to 211 male and female undergraduates who described how they felt at that moment. Extraction of factors was accomplished by the centroid method; the method of estimating communalities was not reported. Factoring was continued until the "product of the two highest loadings in the last residual matrix was no greater than .04 [p. 665]." Sixteen factors were extracted and rotated to orthogonal simple structure using the Varimax procedure. Four of the resulting factors were loaded primarily with the "a priori activation" adjectives and were interpreted as General Activation (lively, active, full of pep . . .), High Activation (clutched up, jittery, stirred up . . .), General Deactivation (at rest, still, leisurely . . .), and Deactivation-Sleep (sleepy, tired, drowsy . . .). Relative contributions of the interpreted factors to total variance were not

reported. Communalities of the variables with 16 factors were of course somewhat higher than in the Nowlis and Green or Borgatta analyses, but were by no means unity.

Douglas M. McNair and Maurice Lorr (1964) carried out three factor analyses of an adjective checklist devised to measure six hypothesized mood factors on samples from an outpatient psychiatric population. The first study used a list of 55 adjectives presented in a 4-point format with anchors selected to represent approximately equal intervals: not at all, a little, quite a bit, and extremely. Two hundred male outpatients used the checklist to describe how they had felt during the preceding week (contrasting with the momentary time-set of Nowlis and Green, Borgatta, and Thayer). Factors were extracted simultaneously by the multiple-group method, the number extracted being determined by an initial clustering of variables, and rotated (visually?) to oblique simple structure. The method of estimating communalities was not reported. In the second and third studies the procedures were the same. The checklist was modified slightly for each in order to clarify or broaden the factors found in the preceding study. Fifty-seven adjectives were administered to 527 male psychotherapy outpatients in the second study; 60 adjective scales, to 150 male outpatients in the third.

Five factors were found in all three analyses: Tension-Anxiety (tense, nervous, on edge . . .), Anger-Hostility

(angry, furious, ready to fight . . .), Depression-Dejection (worthless, helpless, unhappy . . .), Vigor-Activity (lively, vigorous, full of pep . . .), Fatigue-Inertia (tired, fatigued, sluggish . . .). Two additional factors were found in the third study: Friendliness (friendly, cooperative . . .) and Confusion ([not] able to concentrate, [not] able to think clearly, [not] efficient). Intercorrelations of the factors for the third study (all seven factors) ranged from -.55 to .52 with a median of .13. In terms of absolute value, the intercorrelations ranged from |.13| to |.55| with a median of |.41|. The relative contribution of each factor to total variance and the communalities of the variables were not reported.

Maurice Lorr, Paul Daston, and Iola R. Smith (1967) developed and factored a 62-adjective checklist to confirm eight hypothetical mood states suggested by previous studies. One hundred sixty-six male and 173 female undergraduates completed the checklist, describing how they had felt the past "two days, including today [p. 90]." The adjectives appeared as 4-point scales: not at all, a little, quite a bit, and extremely. Factors were extracted by the multiple-group method, using the eight hypothesized factors as initial clusters of variables. Single plane rotations were used to clarify the obtained oblique structure. The method of estimating communalities was not reported.

The eight hypothesized factors were clearly confirmed by the analysis: Cheerful (elated, on top of the world, excited . . .), Energetic (active, energetic, full of pep . . .), Anger-Hostility (furious, annoyed, angry . . .), Tense-Anxious (nervous, anxious, shaky . . .), Depressed (hopeless, helpless, worthless . . .), Enert-Fatigued (weary, tired, sluggish . . .), Thoughtful (introspective, thoughtful, contemplative . . .), Relaxed-Composed (calm, at ease, relaxed . . .). Factors intercorrelated between -.65 and .50 with a median value of .07. Their intercorrelations in terms of absolute value ranged from |.04| to |.65| with a median of |.29|. The variance accounted for by each factor and the communalities of the variables were not reported.

Dean J. Clyde (1963) factored 500 self-ratings obtained from an unspecified population of normal subjects and psychiatric patients on 132 adjectives judged by the author to be relevant to mood and drug effects. IBM cards with one adjective printed on each were sorted by the subjects into four categories--not at all, a little, quite a bit, extremely--descriptive of how they felt that day. To accommodate the available computer, the 132 items were split into three sets of 44 items each by selecting every third item. The items within a set were intercorrelated, and factored by the principal axis method. Orthogonal simple structure was sought through Varimax rotation. If

estimates of communalities were used, they were not reported. From the three independent factor solutions 44 items having highest factor loadings were selected and refactored. The six largest factors from this final solution were interpreted: Friendly (good-natured, pleasant, kind . . .), Aggressive (boastful, forceful, rude . . .), Clearthinking (efficinet, alert, clearthinking . . .), Sleepy (sleepy, drowsy, fatigued . . .), Unhappy (sad, down-hearted, troubled . . .), Dizzy (sick to the stomach, dizzy, jittery . . .). The amount of variance accounted for by each factor and the communality of the variables were not reported.

Kenneth I. Howard and James A. Hill (1967) reported in the context of evaluating the criterion of meaningfulness in factor selection and interpretation a "Chain P-factor analysis" of 45 adjectives presented in a true checklist format (scored 1 for checking and 0 for not checking). The data cube consisted of 45 female outpatients by 45 adjectives by 10 consecutive therapy sessions. Each patient was asked to check how she felt during her preceding therapy hour. Individual score matrices were constructed for the 10 sessions and ipsatized by transforming each to a mean of 0 and standard deviation of 1. Adjectives were then intercorrelated across patients and occasions. Factoring was accomplished by the principal component method and rotation to orthogonal simple structure

by Varimax.

A novelty of the design was a parallel factoring of random data. The real data solution resulted in 14 factors by the maximum number of common factors criterion (Howard & Gordon, 1963) accounting for 53% of the total variance; the random data resulted in 13 factors, accounting for 42% of the total variance. When submitted to judges, six real data factors were discriminated from random factors in 90% of the comparisons. These factors were not interpreted but their salient variables were as follows: I (angry, hurt, rejected . . .), III (anxious, tense, [not] calm . . .), VI (trusting, secure, accepted . . .), IX (confident, effective, cheerful . . .), XIII (discouraged, sad, helpless . . .), XIV (shy, embarrassed . . .). Relative contributions of the factors to total variance were not reported. Communalities of the variables (for 14 factors) ranged from .39 to .66 with a median of .54.

Kenneth I. Howard, David E. Orlinsky, and James A. Hill (1970) reported the factoring of two sets of adjectives descriptive respectively of patients' and therapists' affective experience in psychotherapy. The 3-point (no, some, a lot) adjective scales appeared as part of the Therapy Session Report, Forms P and T. One hundred eight female outpatients completed 33 adjective scales following from 5 to 66 consecutive therapy sessions while 17 male and female therapists completed 27 scales following from 5 to

64 sessions. The time reference was how they had felt during the immediately preceding therapy hour. Correlations were calculated by selecting five sessions from each patient's (therapist's) series at random, intercorrelating the scales across subjects by "session," and then averaging the five matrices using Fisher's r to z transformations. Factors were extracted by the principal components method and the "maximum number of common factors [Howard, Orlinsky, & Hill, 1969, p. 399]" were retained. Varimax rotation was used to approximate orthogonal simple structure.

From the set of adjectives descriptive of patients' feelings during therapy, eight factors, accounting for 63% of the total variance, emerged. The factors were labeled as follows: Inhibited (inhibited, embarrassed, cautious . . .), accounting for 12% of the total variance; Relieved (grateful, relieved, hopeful . . .), accounting for 10%; Depressed (tearful, hurt, depressed . . .), 9%; Erotized Affection (affectionate, sexually attracted, close . . .), 7%; Confident (relaxed, confident, likeable . . .), 7%; Anxious (serious, anxious, frustrated . . .), 6%; Somatic Distress (thirsty, tired, ill . . .), 6%; Angry (angry, impatient . . .), 5%. Communalities of the variables ranged from .49 to .71 with a median of .63.

From the set of adjectives descriptive of therapists' feelings, eight factors emerged accounting for 62% of the total variance. They were interpreted as follows:

Expansive-Confident (confident, optimistic, cheerful . . .), accounting for 13% of the total variance; Uncertain (perplexed, unsure, frustrated . . .), accounting for 10%; Detached vs. Involved ([not] interested, detached . . .), 9%; Intimate (sympathetic, close, affectionate . . .), 7%; Disturbing Sexual Arousal (sexually stimulated, annoyed, attracted . . .), 6%; Alert vs. Tired ([not] tired, [not] distracted, alert . . .), 6%; Demanding (demanding, bored . . .), 5%. Communalities of the variables ranged from .41 to .74 with a median of .66. No attempt was made to relate the dimensions obtained from the two sets of adjective scales for the obvious reason that only seven adjectives were present on both lists.

C. E. Izard, J. E. Chappell, and Faye Weaver (1970) reported as an aspect of the development of the Differential Emotion Scale a factor analysis of 72 adjectives selected to represent "the nine fundamental emotions as defined by Izard (1971) [p. 357]." Adjectives appeared as 5-point scales; anchors, if used, were not reported. Subjects consisted of 1,182 freshmen who were asked to describe their emotions at the present time or in some imagined situation. Scales were intercorrelated and factored (technique not specified). Rotation to simple structure was carried out by the Promax procedure. Izard et al. wrote that eight factors were found (criterion not specified), though they presented nine in their table of "loadings" (two being labeled Shame).

Their factors were as follows: Interest-Excitment (attentive, concentrating, alert . . .), Enjoyment-Joy (joyful, delighted, gay . . .), Surprise-Startle (astonished, amazed, surprised . . .), Disgust (sickened, repulsion, jittery . . .), Anger-Disgust-Contempt (scornful, irritated, defiant . . .), Guilt (Shame) (repentant, guilty, blameworthy . . .), Shyness (Shame) (sheepish, shy . . .), Fear-Distress (fearful, afraid, scared . . .), Fatigue-Sleepiness (fatigued, tired, sleepy . . .). The relative contributions of the factors to total variance, the communalities of the variables, and the intercorrelations of the factors were not reported.

The studies reviewed here represent two ways of approaching the problem of the dimensionality and structure of feelings--two traditions. Within each tradition, relatively consistent results have emerged; but between, an impressive lack of congruence. As noted in the introduction, the present research addressed itself to this lack of congruence through attempting to develop an independent line of evidence on dimensionality and structure. A fuller discussion of the relationships between traditions will therefore be deferred until the results of the present research have been presented.

PART II:

EMPIRICAL SELECTION OF ADJECTIVES DENOTING FEELINGS

Defining the boundaries of a domain to be explored in psychology is a difficult task. A classic example is what to include in the domain of personality. One approach to the problem is for the investigator, with the help of tradition, to set up operational criteria to discriminate personality from other forms of behavior. Another is to return in some way to the roots out of which the popular conception, now become scientific, grew: namely the complex of language and experience which is a particular culture. Cattell (1943a, 1943b, 1945) is notable in his use of this approach, taking Allport and Odbert's (1936) list of trait names in English to define the domain of personality.

With a renewed interest of psychology in feelings (Borgatta, 1961; Clyde, 1963; Ekman & Friesen, 1971; Izard, Chappell, & Weaver, 1970; Nowlis & Green, 1957; Thayer, 1967; Tomkins, 1962, 1963; Tomkins & Izard, 1965; Zuckerman & Lubin, 1965) some attempt to define the boundaries of this domain would seem important, particularly when the question of dimensionality and structure remains an issue, as has been noted in the Introduction and Part I. The study reported in Part II was such an attempt. It was based on the assumption that feelings which have had social

importance have been symbolized in language and that the set of American English adjectives denoting feelings therefore defines or spans this domain. The problem it attempted to solve was the discrimination of adjectives denoting feelings from those denoting personality (i.e., the stable traits of a person) and behavior. It was seen as an important preliminary step in the development of the multidimensional scale of adjectives denoting feelings reported in Part III.

Method

Seven hundred twenty-three college students from four universities judged whether each of 2186 adjectives most seemed to denote "how a person acts, what a person is like, or what a person feels"--analogues respectively for behavior, personality, and feelings. (See Stimuli, Responses, and Instructions below.)

Subjects

The makeup of the final sample is presented in Table 1. All subjects were enrolled in psychology courses at the time of the study. About 150 volunteered for course credit, the remainder consenting to participate during class time. The university populations sampled ranged in socio-economic level from predominately full-time, upper-

Table 1

Distribution of Subjects by Major Classification

Category	Classification	No. of Subjects
Race	Black	233
	White	490
Sex	Male	274
	Female	449
Grade	Freshman	75
	Sophomore	324
	Junior	210
	Senior	114
University	LSU	225
	SLU	115
	SU	212
	USL	171

middle-class students to predominately part-time or commuting, working-class students.

Subjects who were not native English speakers or who had special grade status (e.g., older adults returning to college) were eliminated from the sample prior to analysis and are not represented in Table 1.

Stimuli

The list of 2186 adjectives (see Appendix A) was culled from previous research on feelings, moods, and affects (Clyde, 1963; Howard & Hill, 1967; Howard, Orlinsky, & Hill, 1969, 1970; Izard, Chappell, & Weaver, 1970; Lorr, Daston, & Smith, 1967; McNair & Lorr, 1964; Nowlis & Green, 1957, 1964, 1965; Thayer, 1967) and greatly expanded with the help of a thesaurus. Every effort was made to include all adjectives which subjects might judge to denote feelings. The list was partitioned into 11 sets of 200 adjectives (the last set containing some adjectives from other sets). Within each set, four random orders and their mirrors were created. Each order constituted a form, giving 88 forms in all. The 200 words constituting each form were arranged on a computer print-out in four columns of 50 words each. Subjects were instructed to work down the columns.

Responses

Response alternatives consisted of four pairs of letters (BH, PS, FL, DK) printed beside each adjective. Subjects were asked to circle the alternative corresponding to their judgment. In the instructions these pairs were associated respectively with behavior, "how a person acts"; personality, "what a person is like"; feelings, "what a person feels"; and don't know. The order of alternatives was determined randomly for each row on a form and rotated for each column within a row by placing successive alternatives first. For example, if BH PS FL DK appeared in column 1, PS FL DK BH, FL DK BH PS, and DK BH PS FL would appear in columns 2, 3, and 4 respectively. Each alternative appeared an equal number of times in each position on a copy of a form. Printing stimulus and response alternatives together meant that copies were used only once. No two response formats were exactly alike even for copies of the same form.

Instructions

The instructions were designed to introduce and clarify the meaning of response alternatives. They were read aloud by the experimenter while subjects read them silently before each experimental session. The first paragraph of Dostoyevsky's Notes from the underground was used to introduce the idea that words give information about three

aspects of a person: "how a person acts, what a person is like, and what a person feels." The experimental task was described as deciding "which aspect of a person each word in the list below applies to most." Loud, trustworthy, and happy were cited as examples of words denoting behavior, personality, and feelings respectively. The 2-letter abbreviations were introduced for these three categories and subjects were given an opportunity to use them in relation to the three examples and three new words, idealistic, angry, and slow. After responding to the sample words, feedback about the new words was given. Subjects were told, "If you judged idealistic to apply most to personality, you should have circled PS." A similar form was used to identify angry with feelings and slow with behavior. The don't know category was introduced to apply to two situations: when a subject was unfamiliar with a particular word, and when all of the categories seemed inappropriate. The experimental task was restated along with the meaning of the response alternatives. The instructions concluded by informing subjects that their best judgments were likely to come in the first few seconds after reading a word, and for that reason they should not spend too much time deciding on an alternative (see Appendix B for a verbatim copy of the instructions).

Results

The analysis centered on the FL (feelings) category, as opposed to the others which were treated as distractors in the tests and measurements sense. As the goal of the experiment was to obtain a list of adjectives judged by college students--black, white, male, female, freshman through senior--to denote feelings, and since the size of the experiment precluded experimental balancing of the three classification variables, a preliminary investigation of the necessity of applying statistical corrections for imbalance was carried out. One hundred adjectives were selected at random and linear models expressing the hypothesized effects of race, sex, grade, and their interactions were fitted to each. Method II of Overall and Spiegel (1969) was used. The dependent variable was of course binary, but the number of judgments per word, ranging from 58 to 100, was judged sufficient to justify the normal approximation to the binomial and the use of the F statistic. For all but one adjective the third order interaction was untestable due to incomplete representation of classification variates. For 52 of the adjectives the second order interaction was also untestable. Of the second order interactions tested, only five were significant at the .05 level, four for race by grade. Considering the number of tests involved, it was concluded that no evidence existed for

second order interaction effects.

Main effects of race, sex, and grade were tested for all 100 words. Of these 300 tests, 17 were significant at the .05 level. Again considering the number of tests, there seemed to be little evidence for effects of classification variates on the discrimination of feelings from behavior and personality.

Since no clear evidence of effects due to race, sex, or grade level emerged, the proportion of subjects agreeing an adjective denoted feelings was used directly as the least squares estimate of consensus in the college population sampled. Ninety-five percent confidence intervals were calculated. The distribution of consensus scores across adjectives in descending order of consensus was examined but revealed no "natural" breaks and so all words with .5 agreement or better whose confidence intervals excluded .49 were accepted as denoting feelings. Two hundred sixty-four adjectives met that criterion and are presented in Table 2 with their consensus scores and confidence intervals. The degree of consensus ranged from .97 to .62.

Discussion

The list of adjectives denoting feelings which emerged from the study seems generally consistent with common sense. It does not include some words which psychologists might

Table 2

Adjectives Denoting Feelings

Adjective	Consensus	Adjective	Consensus
Abandoned	.75 ± .10	Bitter	.69 ± .11
Abused	.66 ± .12	Blue	.84 ± .09
Afraid	.72 ± .11	Bored	.78 ± .10
Aggravated	.79 ± .10	Breathless	.66 ± .11
Aggrieved	.62 ± .12	Brokenhearted	.91 ± .07
Alarmed	.62 ± .12	Burning	.73 ± .11
Alone	.82 ± .09	Certain	.62 ± .12
Amazed	.65 ± .11	Cheered	.75 ± .10
Amused	.63 ± .12	Cheerless	.68 ± .11
Angered	.75 ± .10	Clutched up	.62 ± .12
Angry	.83 ± .09	Concerned	.67 ± .11
Anguished	.77 ± .10	Confused	.76 ± .10
Annoyed	.74 ± .11	Consoled	.68 ± .11
Anxious	.63 ± .12	Content	.72 ± .11
Aroused	.76 ± .10	Contented	.71 ± .11
Ashamed	.84 ± .09	Cozy	.83 ± .10
Astonished	.79 ± .10	Cramped	.74 ± .11
At ease	.71 ± .10	Crushed	.73 ± .11
At peace	.75 ± .10	Dazed	.77 ± .11
Awe-struck	.81 ± .10	Defeated	.67 ± .12
Baffled	.76 ± .10	Deflated	.66 ± .12
Beloved	.62 ± .12	Dejected	.80 ± .10
Bewildered	.80 ± .10	Delighted	.80 ± .10

Adjective	Consensus
Depressed	.88 ± .08
Deprived	.72 ± .12
Desperate	.69 ± .12
Disappointed	.87 ± .09
Discontented	.72 ± .11
Discouraged	.92 ± .07
Disenchanted	.63 ± .12
Disgraced	.68 ± .11
Disgusted	.81 ± .09
Disheartened	.72 ± .11
Disillusioned	.68 ± .12
Dismayed	.74 ± .10
Displeased	.80 ± .10
Dissatisfied	.82 ± .10
Distressed	.83 ± .09
Dizzy	.82 ± .09
Doomed	.73 ± .09
Doubtful	.64 ± .11
Down-hearted	.78 ± .10
Dreadful	.65 ± .12
Dreary	.67 ± .12
Droopy	.64 ± .12
Drowsy	.80 ± .10
Elated	.63 ± .11

Adjective	Consensus
Embarrassed	.86 ± .08
Empty	.79 ± .10
Encouraged	.64 ± .11
Enjoyed	.62 ± .12
Enraged	.66 ± .12
Envious	.66 ± .12
Exasperated	.77 ± .11
Excited	.72 ± .11
Exhausted	.74 ± .10
Faint	.73 ± .11
Fascinated	.67 ± .11
Fatigued	.82 ± .09
Fearful	.72 ± .11
Fed-up	.79 ± .10
Feverish	.80 ± .10
Flabbergasted	.71 ± .11
Frightened	.80 ± .10
Frustrated	.84 ± .09
Fulfilled	.72 ± .11
Full of pity	.68 ± .11
Furious	.67 ± .10
Gay	.72 ± .11
Glad	.92 ± .06
Gladdened	.69 ± .11

Adjective	Consensus
Gleeful	.62 ± .11
Gloomy	.77 ± .11
Glorious	.71 ± .12
Glum	.65 ± .11
Grateful	.67 ± .11
Gratified	.64 ± .11
Grief-stricken	.90 ± .08
Grief-laden	.72 ± .10
Grieved	.90 ± .07
Guiltless	.66 ± .11
Guilty	.78 ± .10
Happy	.90 ± .07
Hazy	.65 ± .11
Heartbroken	.90 ± .07
Heartened	.65 ± .11
Heartsick	.92 ± .07
Heartsore	.72 ± .11
Heart-stricken	.81 ± .09
Heavyhearted	.69 ± .11
High	.66 ± .12
Homesick	.85 ± .09
Hopeful	.78 ± .10
Horrified	.88 ± .08
Horror-stricken	.83 ± .10

Adjective	Consensus
Humiliated	.90 ± .07
Hungry	.83 ± .09
Hurt	.94 ± .06
Ignored	.64 ± .11
Ill	.88 ± .08
Ill-at-ease	.65 ± .12
Impressed	.76 ± .10
In agony	.88 ± .08
In anguish	.67 ± .11
Infatuated	.68 ± .11
Injured	.70 ± .11
In love	.89 ± .07
In pain	.82 ± .10
Insecure	.69 ± .11
Inspired	.63 ± .12
Insulted	.75 ± .10
Intimate	.65 ± .12
Intimidated	.70 ± .11
Irked	.70 ± .12
Irritated	.82 ± .09
Itchy	.64 ± .11
Jealous	.70 ± .12
Joyful	.78 ± .10
Joyless	.82 ± .09

Adjective	Consensus	Adjective	Consensus
Joyous	.81 ± .09	Overjoyed	.80 ± .10
Jubilant	.67 ± .11	Overstuffed	.72 ± .12
Lonely	.97 ± .04	Overwhelmed	.87 ± .09
Lonesome	.93 ± .06	Overworked	.73 ± .11
Lousy	.67 ± .11	Pained	.85 ± .09
Loved	.93 ± .06	Passionate	.64 ± .12
Lovesick	.84 ± .09	Peeved	.66 ± .11
Low	.79 ± .10	Persecuted	.73 ± .11
Lucky	.70 ± .11	Petrified	.70 ± .11
Mad	.69 ± .11	Plagued	.62 ± .12
Maddened	.62 ± .12	Pleased	.75 ± .10
Melancholy	.69 ± .11	Pressed	.65 ± .11
Merry	.73 ± .11	Protected	.69 ± .11
Miserable	.89 ± .07	Reassured	.71 ± .11
Mistreated	.70 ± .11	Refreshed	.84 ± .09
Mournful	.80 ± .10	Regretful	.81 ± .09
Nauseated	.85 ± .09	Rejected	.88 ± .08
Nauseous	.77 ± .10	Relaxed	.72 ± .10
Needed	.79 ± .10	Rested	.68 ± .12
Neglected	.80 ± .10	Revived	.62 ± .11
Numb	.86 ± .08	Sad	.93 ± .06
Offended	.77 ± .11	Safe	.66 ± .11
Oppressed	.73 ± .11	Satisfied	.83 ± .09
Outraged	.66 ± .12	Scared	.87 ± .09

Adjective	Consensus
Secure	.73 ± .11
Self-satisfied	.66 ± .11
Sentimental	.73 ± .11
Shaken	.75 ± .11
Shamed	.82 ± .09
Shattered	.69 ± .11
Shocked	.75 ± .11
Sick	.91 ± .07
Sick at heart	.87 ± .08
Sickened	.80 ± .10
Sleepy	.72 ± .11
Slighted	.66 ± .11
Soothed	.76 ± .10
Sore	.75 ± .10
Sore at heart	.76 ± .10
Sorrow-burdened	.75 ± .10
Sorrowful	.84 ± .09
Sorrow-laden	.74 ± .10
Sorrow-stricken	.91 ± .07
Sorrow-worn	.68 ± .12
Sorry	.85 ± .08
Startled	.63 ± .12
Starved	.76 ± .10
Stunned	.78 ± .10

Adjective	Consensus
Suffering	.82 ± .09
Suffocated	.65 ± .12
Suppressed	.72 ± .11
Sure	.74 ± .11
Surprised	.77 ± .10
Sympathetic	.67 ± .11
Tense	.85 ± .09
Terrified	.89 ± .07
Terrorized	.69 ± .11
Thankful	.70 ± .11
Thirsty	.80 ± .10
Thrilled	.91 ± .07
Tickled	.68 ± .12
Tingly	.68 ± .11
Tired	.82 ± .09
Tormented	.64 ± .11
Tortured	.75 ± .11
Touched	.72 ± .11
Triumphant	.75 ± .10
Troubled	.85 ± .08
Unassured	.65 ± .12
Uncared for	.70 ± .10
Uncomfortable	.83 ± .10
Uncontented	.65 ± .11

Adjective	Consensus	Adjective	Consensus
Uncontent	.76 ± .10	Unworried	.65 ± .12
Undistressed	.70 ± .10	Upset	.75 ± .10
Unfrightened	.66 ± .11	Useless	.63 ± .12
Unfulfilled	.66 ± .12	Wanted	.75 ± .10
Unglad	.82 ± .09	Warm	.73 ± .11
Unhappy	.86 ± .08	Weary	.75 ± .10
Unimportant	.72 ± .11	Welcome	.66 ± .12
Unjoyful	.80 ± .10	Well	.82 ± .09
Unjoyous	.81 ± .09	Well-satisfied	.75 ± .10
Unpleased	.75 ± .10	Woeful	.77 ± .10
Unprotected	.75 ± .10	Woe-stricken	.67 ± .11
Unsatisfied	.66 ± .11	Worried	.88 ± .08
Untroubled	.69 ± .11	Wounded	.69 ± .11

want included, such as sexy or helpless. But when one considers that subjects were asked to discriminate feelings from behavior and personality, such exclusions for the most part seem appropriate. It also excludes some adjectives which writers might wish included, such as acrimonious or maudlin. Here the reason is undoubtedly that such words are not sufficiently familiar to most college students to receive many judgments. Some of the adjectives with high consensus as feelings are lonely, hurt, lonesome, sad, loved, glad, and heartsick. Some of those with low consensus are maddened, enjoyed, certain, revived, gleeful, beloved, and alarmed. That lonely received highest consensus as a feeling, followed by hurt and lonesome, is perhaps a little striking and one is tempted to speculate on the frequency of these feelings in the college population. However, the pattern does not seem to be a general one. Other patterns of relationship between feelings and judged consensus are not readily apparent.

The list of adjectives emerging from the study, then, is representative of consensus in a college population of men and women, blacks and whites, freshmen, sophomores, juniors, and seniors--consensus that each adjective denotes feelings rather than personality or behavior. Its utility beyond the present research should be in studies which require labels for feelings which are relatively free from personality or behavioral referents.

PART III:
INDIVIDUAL DIFFERENCES MULTIDIMENSIONAL SCALING OF ADJECTIVES DENOTING FEELINGS

The background for the study reported in Part III has been given in the Introduction. As is noted there, it is the principal study in this research, and makes use of the adjectives defined by the study described in Part II.

Method

A multidimensional scale of adjectives denoting feelings (MDSADF) was constructed from the similarities judgments of college students by the Individual Differences Multidimensional Scaling (INDSCAL) method of Carroll and Chang (1970). The INDSCAL method makes an important provision for individual differences in perception by solving simultaneously for a group perceptual space and a set of weights for each subject, expressing the relative importance each assigns to the dimensions of the space in making judgments of similarity (see Appendix C for a fuller description). The 264 adjectives selected by the study described in Part II as spanning the domain of feelings were judged pair-wise for their degree of similarity by 762 students from four universities. The study was divided into two replications to provide estimates of reliability. Two scales (R scales) of 264 adjectives were constructed and combined in the final

MDSADF (multidimensional scale of adjectives denoting feelings).

Forward Solution

Scaling was carried out independently for each replication in four successive stages or levels. At the first level of the design the initial pool of 264 adjectives was partitioned randomly into groups of 20 and a multidimensional scale constructed by the INDSCAL method for each partition (16 adjectives appeared in more than one partition so all partitions would have 20 words). An estimate of the dimensionality of the domain was made based on the resulting 14 partition scales (P scales). Five, four, three, and two dimensional solutions were examined for each P scale with respect to the variance accounted for by each. In terms of variance accounted for, the most parsimonious number of dimensions appeared to be four, which became the estimate. The initial pool of adjectives was reduced by eliminating all but eight adjectives from each partition, two for each dimension of a P scale: the two adjectives retained for each dimension were required to have higher scale values (in absolute terms) on that dimension than any other adjectives in the partition. Any duplications in the reduced pool were also eliminated.

At the second and third levels of the design, the pool of adjectives was partitioned, scaled, and reduced following

the procedures used at Level 1. The estimate of dimensionality obtained at Level 1 was kept throughout, however. At the fourth level a single partition of 20 adjectives was scaled. Table 3 summarizes the design.

The stimuli for each scaling consisted of all pair-wise combinations of the 20 adjectives within a partition, or 190 pairs. Four forms were constructed to balance order of presentation of the stimuli, which was random, and the position of the adjectives within a stimulus (first or second).

Responses consisted of the digits 0 - 9 which subjects were asked to write in boxes on their answer sheet corresponding to a given stimulus. The digits were given meaning by a 10-point scale of similarity (actually dissimilarity) printed at the top of the answer form. Zero was labeled "identical, no difference"; 9 was labeled "completely different, no similarity." The digits 1 - 8 appeared at tic marks equally spaced along a line drawn between 0 and 9, and were identified in the instructions as representing "equal steps" in the range of similarity defined by the extremes.

The instructions presented the experimental task as judging "the similarity or difference of pairs of feelings." The subjects were thus directed to the referents of the adjectives rather than to the adjectives themselves. Subjects were told that they had about 40 minutes in which to

Table 3

Summary of Design

Level	Number of partitions[a]	Size of adjective pool
1	14	264
2	6	110[b], 112[c]
3	3	45[b], 46[c]
4	1	20

[a] Twenty adjectives per partition.

[b] Replication 1.

[c] Replication 2.

complete the task and for that reason they should spend no more than 15 seconds on each judgment (see Appendix D for a verbatim copy of the instructions).

All subjects were enrolled in psychology at the time of the experiment. All but 17 participated in the study during class time. The number of subjects allocated to each partition was directly related to the precision required of the resulting P scale, which was in turn related to its level in the design. Error in the scales at the upper levels of the design would be amplified and passed to lower levels in the back solution (see Back Solution below). An attempt was made to make subjects allocated to each partition as representative of the general college population as possible.

Table 4 summarizes the distribution of subjects by partition. Order and position effects were balanced by randomly eliminating subjects by forms when the loss of subjects would not in itself seriously increase the likelihood of error. The type of balancing used for each partition is also reported in Table 4.

At the conclusion of the forward solution 24 P scales had been created for each replication--each with its own origin, unit of measurement, and orientation of axes. Each scale had, however, at least eight adjectives in common with scales at the next higher level.

Table 4

Replication 1: Distribution of Subjects by Partition

Partition	Balancing[a]	Race		Sex		Grade				University				Total
		BL	WH	M	F	FR	SO	JR	SR	LSU	SLU	SU	USL	
Level 1														
1	0	4	3	4	3	2	1	4	0	3	0	3	1	7
2	0	4	3	4	3	2	2	3	0	4	0	3	0	7
3	0	3	6	5	4	0	4	4	1	5	0	3	1	9
4	0	2	6	3	5	1	5	2	0	5	0	2	1	8
5	0	4	6	5	5	1	6	2	1	6	0	4	0	10
6	0	1	7	4	4	3	2	1	2	4	0	1	3	8
7	0	3	5	5	3	1	3	2	2	4	0	3	1	8
8	0	2	5	4	3	2	3	2	0	4	0	1	2	7
9	0	4	6	8	2	2	3	3	2	5	0	4	1	10
10	0	3	4	4	3	4	2	0	1	3	0	3	1	7
11	0	2	6	2	6	3	0	3	2	3	1	1	3	8
12	0	4	5	5	4	3	1	3	2	2	3	4	0	9
13	0	3	6	4	5	1	3	4	1	5	1	3	0	9

Partition	Balancing[a]	Race		Sex		Grade				University				Total
		BL	WH	M	F	FR	SO	JR	SR	LSU	SLU	SU	USL	
14	0	4	5	6	3	2	3	3	1	5	0	4	0	9
Level 2														
1	2	5	11	5	11	3	5	7	1	6	0	5	5	16
2	2	4	12	6	10	4	4	6	2	7	2	4	3	16
3	2	4	8	2	10	3	6	2	1	5	3	3	1	12
4	2	1	11	5	7	4	4	3	1	5	2	1	4	12
5	2	4	8	6	6	1	6	5	0	5	0	3	4	12
6	2	2	10	5	7	5	3	4	0	3	3	2	4	12
Level 3														
1	2	10	18	16	12	6	9	6	7	8	7	9	4	28
2	2	14	18	9	23	3	14	8	7	10	4	13	5	32
3	2	12	20	14	18	4	8	10	10	11	2	13	6	32
Level 4														
1	2	33	67	37	63	18	36	34	12	40	5	31	24	100

Replication 2: Distribution of Subjects by Partition

Partition	Balancing[a]	Race		Sex		Grade				University				Total
		BL	WH	M	F	FR	SO	JR	SR	LSU	SLU	SU	USL	
Level 1														
1	0	2	6	7	1	5	1	2	0	4	1	2	1	8
2	0	3	5	4	4	2	2	1	3	2	1	1	4	8
3	0	3	7	6	4	0	5	3	2	7	0	3	0	10
4	0	2	5	5	2	1	4	1	1	4	0	2	1	7
5	0	4	6	6	4	3	5	1	1	5	1	4	0	10
6	0	3	6	6	3	0	5	4	0	3	2	3	1	9
7	0	3	5	4	4	1	3	3	1	5	0	3	0	8
8	0	4	4	4	4	0	3	4	1	4	0	4	0	8
9	0	4	4	4	4	2	3	3	0	3	0	4	1	8
10	0	2	7	7	2	1	5	3	0	5	0	2	2	9
11	0	4	3	6	1	2	3	2	0	0	0	4	3	7
12	0	4	4	2	6	1	3	2	2	2	0	3	3	8
13	0	1	7	4	4	0	7	1	0	4	0	1	3	8

Partition	Balancing[a]	Race		Sex		Grade				University				Total
		BL	WH	M	F	FR	SO	JR	SR	LSU	SLU	SU	USL	
14	0	3	5	5	3	1	5	0	2	3	0	3	2	8
Level 2														
1	2	6	10	1	15	2	10	4	0	8	0	4	4	16
2	2	2	14	4	12	6	5	3	2	7	4	1	4	16
3	2	2	10	1	11	3	6	1	2	6	4	1	1	12
4	2	0	12	5	7	2	6	4	0	7	3	0	2	12
5	2	4	8	2	10	3	3	5	1	4	2	4	2	12
6	2	3	9	6	6	0	7	3	2	4	1	3	4	12
Level 3														
1	2	9	19	10	18	3	8	7	10	9	7	8	4	28
2	1	11	15	13	13	3	12	5	6	8	4	9	5	26
3	1	13	11	10	14	4	6	6	8	4	4	13	3	24
Level 4														
1	2	30	70	38	62	17	35	31	17	46	2	27	25	100

[a] 0 - Order and position effects not balanced.

1 - Subjects eliminated randomly to balance main effects of position and order only.

2 - Subjects eliminated randomly to balance main effects and interaction of position and order.

Back Solution

To construct an R scale (replication scale) from the separate P scales (partition scales), a transformation, involving orthogonal rotation, rescaling, and translation was applied to each P scale in turn, working backward from Level 4. At the beginning of the process the P scale of Level 4 was defined as the R scale. The transformation of each P scale below Level 4 was determined by the adjectives it had in common with the existing R scale. After transformation, adjectives not in common with the R scale were added to it and served in turn as common adjectives for the scales at the lower levels of the design.

The algorithm followed at each step of the back solution was as follows:

1. The origin of the P scale to be transformed was translated to the centroid of the adjectives it had in common with the existing R scale. The common adjectives of the R scale were recentered in the same way, saving the coordinates of the existing origin for use in Step 4, below.

2. An orthonormal transformation matrix (Cliff, 1966; Schönemann, 1966) was found which rotated the dimensions of the P scale such that the common adjectives of both scales fitted in a least squares sense. The transformation matrix was applied to the P scale. (An orthonormal transformation, of course, implies orthogonal rotation, which was required to preserve the Euclidean properties of the stimulus space.)

3. A diagonal matrix was found which made the variance of the common adjectives on the dimensions of the P scale equal to the variance of the common adjectives on the dimensions of the R scale. The diagonal matrix was applied to the P scale.

4. Using the coordinates saved in Step 1, the P scale was translated to the origin of the R scale.

5. The non-common elements of the P scale were added to the R scale which was recentered at the new centroid, and rescaled to unit variance.

At the conclusion of the back solution, two R scales had been constructed, one for each replication.

Combining R Scales and Final Normalization

An important characteristic of the INDSCAL method is that the orientation of the resulting stimulus dimensions is unique, in a least squares sense (see Appendix C). Twenty-four estimates of the true orientation of the R scales were therefore available within a replication. True is used here in the sense of free from sampling and measurement error. The process of combining R scales to form the MDSADF was initiated by finding two orthonormal matrices which would rotate the scales to congruence (Cliff, 1966). These matrices were then applied to the transformation matrices developed during the back solution. The result was a set of vectors giving the coordinates of the end

points of each dimension (taken to be of unit length) in each partition of both replications in terms of a common reference system. A single vector was then selected from each partition as a best estimate of each dimension. The centroid of these 48 vectors, weighted by the number of subjects contributing to them, was taken as the true orientation for each dimension. The resulting transformation matrix (transposed) was orthogonalized (Cliff, 1966), converted from a common reference system to that specific to each R scale, and applied to each separately. The resulting scales were congruent to each other and retained in an average sense the unique orientation characteristic of the INDSCAL method.

The MDSADF was constructed by averaging corresponding values of the two congruent R scales. The correlations between R scales before averaging served as a basis for estimating the reliabilities of the dimensions of the combined scale. Based on the low correlation between fourth dimensions of the two scales, a decision was made to retain only three dimensions. The final procedure was to re-solve for subject weights, given the values of the MDSADF, and to normalize the MDSADF to represent the view of adjectives denoting feelings of a person at the centroid of the distribution of subject weights. Carroll and Chang (1970), it should be noted, prefer a different procedure. A final interpretive translation of the scale to a centroid of

(5.5, 5.5, 5.5) and a uniform dilation of axes to a root mean square deviation from the centroid of 6 was made so that almost all scale values could be expressed by a number between 0 and 10.

Results

The multidimensional scale of adjectives denoting feelings resulting from combining R scales is presented in Table 5. The decision to retain four dimensions initially, to recapitulate, was based on the distribution of variances accounted for by five through two dimensional solutions at the first level of the design. Three dimensions were retained for the re-solution of subject weights and final normalization because of the low correlation between fourth dimensions of the two R scales (.12 compared to .83, .47, and .22 for Dimensions 1, 2, and 3 respectively). Off-diagonal elements in the matrix of cross-correlations were less than $|.05|$; within R scales, less than $|.19|$.

Dimension 1 of the MDSADF is clearly the traditional Pleasantness-Unpleasantness dimension. Some of the adjectives having values at the positive end of the scale are delighted, joyous, merry, and happy; at the negative end, depressed, discouraged, hurt, and unhappy. The distribution of scale values on the dimension is bimodal and asymmetric, ranging from -.02 to 12.16 with a median of 4.8.

Table 5

Multidimensional Scale of Adjectives Denoting Feelings

Adjective	HL[a]	Dimensions		
		1	2	3
1. Abandoned	2	3.12	6.20	5.36
2. Abused	2	3.57	5.99	6.92
3. Afraid	2	2.92	8.18	4.59
4. Aggravated	4	3.62	5.79	6.96
5. Aggrieved	2	4.06	4.90	7.35
6. Alarmed	2	4.41	10.06	6.07
7. Alone	3	5.00	5.64	7.12
8. Amazed	1	8.22	7.26	8.14
9. Amused	4	8.83	5.92	5.86
10. Angered	1	3.97	6.74	6.10
11. Angry	2	5.15	6.08	7.09
12. Anguished	1	4.29	4.81	5.72
13. Annoyed	1	2.78	5.96	6.57
14. Anxious	2	5.75	8.28	6.32
15. Aroused	2	6.10	9.70	3.80
16. Ashamed	2	3.98	5.53	8.12
17. Astonished	2	5.74	8.43	2.75
18. At ease	2	10.38	5.26	6.05
19. At peace	4	9.78	4.60	4.56
20. Awe-struck	4	4.99	9.64	3.32
21. Baffled	2	3.72	6.46	6.22
22. Beloved	2	8.76	5.25	5.91
23. Bewildered	1	3.91	7.15	6.35
24. Bitter	3	3.02	7.24	6.29
25. Blue	1	5.38	3.72	4.40
26. Bored	4	3.85	2.59	5.19
27. Breathless	2	7.74	5.73	8.35
28. Brokenhearted	1	2.36	4.90	5.57

Adjective	HL[a]	Dimensions		
		1	2	3
29. Burning	2	4.04	7.19	5.32
30. Certain	1	9.56	5.11	7.54
31. Cheered	2	9.37	5.64	4.54
32. Cheerless	2	4.11	4.15	5.74
33. Clutched up	1	3.54	6.02	5.23
34. Concerned	4	5.08	7.31	6.62
35. Confused	1	2.96	7.16	4.52
36. Consoled	3	8.19	5.13	4.25
37. Content	1	9.79	4.59	6.38
38. Contented	2	9.44	4.60	4.29
39. Cozy	1	10.89	3.75	4.64
40. Cramped	2	2.92	5.84	3.72
41. Crushed	1	4.21	3.07	5.11
42. Dazed	2	5.21	7.24	4.29
43. Defeated	1	1.17	4.64	4.72
44. Deflated	1	5.40	2.68	4.82

Adjective	HL[a]	Dimensions		
		1	2	3
45. Dejected	2	3.75	3.96	4.60
46. Delighted	2	12.16	5.68	7.44
47. Depressed	1	-0.02	4.78	3.94
48. Deprived	4	3.62	2.78	7.36
49. Desperate	1	3.46	7.16	0.30
50. Disappointed	2	2.72	5.52	6.19
51. Discontented	1	4.52	4.36	3.14
52. Discouraged	1	1.67	4.52	4.85
53. Disenchanted	1	3.85	4.88	6.04
54. Disgraced	3	3.85	5.87	7.62
55. Disgusted	1	3.26	4.06	5.56
56. Disheartened	1	4.04	4.10	7.07
57. Disillusioned	3	4.41	4.95	6.05
58. Dismayed	1	3.10	6.47	5.76
59. Displeased	2	3.00	5.79	7.56
60. Dissatisfied	1	2.85	4.37	4.45

Adjective	HL[a]	Dimensions		
		1	2	3
61. Distressed	1	2.46	5.38	6.27
62. Dizzy	4	5.22	6.69	3.26
63. Doomed	1	3.71	7.85	5.59
64. Doubtful	2	3.19	5.94	5.56
65. Down-hearted	2	2.51	4.71	5.31
66. Dreadful	1	3.88	5.16	6.09
67. Dreary	1	4.44	3.62	4.82
68. Droopy	3	5.37	3.00	3.42
69. Drowsy	4	5.96	3.12	2.05
70. Elated	1	8.49	6.52	4.94
71. Embarrassed	3	3.29	6.76	6.35
72. Empty	2	6.10	5.24	3.99
73. Encouraged	1	10.24	7.22	4.57
74. Enjoyed	3	10.39	6.52	6.22
75. Enraged	3	4.45	6.13	8.73

Adjective	HL[a]	Dimensions		
		1	2	3
76. Envious	3	4.70	6.33	6.28
77. Exasperated	1	6.48	7.41	7.64
78. Excited	1	7.10	8.85	6.83
79. Exhausted	4	4.52	5.60	3.70
80. Faint	1	3.96	4.25	5.30
81. Fascinated	2	9.65	6.60	5.10
82. Fatigued	4	5.14	3.16	5.58
83. Fearful	2	4.48	7.97	4.48
84. Fed-up	2	4.20	5.50	6.74
85. Feverish	3	4.14	7.21	4.21
86. Flabbergasted	1	5.73	5.64	7.40
87. Frightened	4	2.69	8.68	5.41
88. Frustrated	2	4.39	3.23	6.77
89. Fulfilled	2	11.88	4.42	7.02
90. Full of pity	2	1.88	3.99	4.36

Adjective	HL[a]	Dimensions		
		1	2	3
91. Furious	3	4.55	5.83	9.03
92. Gay	1	10.07	7.23	6.96
93. Glad	2	10.17	4.86	7.03
94. Gladdened	2	10.59	6.33	6.32
95. Gleeful	1	10.14	5.17	4.74
96. Gloomy	3	5.47	4.34	7.26
97. Glorious	2	9.98	6.50	4.77
98. Glum	2	4.50	2.83	3.41
99. Grateful	2	10.00	6.08	6.93
100. Gratified	3	9.86	5.70	4.46
101. Grief-stricken	2	2.46	7.11	4.67
102. Grief-laden	4	2.80	4.88	3.55
103. Grieved	1	3.44	6.41	7.11
104. Guiltless	1	9.41	4.37	4.59
105. Guilty	2	4.33	7.60	4.49

Adjective	HL[a]	Dimensions		
		1	2	3
106. Happy	2	9.45	7.15	6.73
107. Hazy	2	5.62	4.76	6.30
108. Heartbroken	1	2.53	4.97	6.27
109. Heartened	4	7.18	5.13	1.36
110. Heartsick	1	4.77	3.33	4.52
111. Heartsore	2	4.96	2.57	5.62
112. Heart-stricken	1	3.04	4.74	5.88
113. Heavyhearted	2	2.75	4.90	4.67
114. High	3	8.86	7.70	4.81
115. Homesick	2	4.76	4.53	3.93
116. Hopeful	1	8.83	4.48	4.54
117. Horrified	4	2.98	9.28	5.62
118. Horror-stricken	4	2.88	9.68	4.12
119. Humiliated	1	4.05	4.27	7.35
120. Hungry	4	4.56	4.74	4.59

Adjective	HL[a]	Dimensions		
		1	2	3
121. Hurt	1	2.09	6.52	5.69
122. Ignored	2	5.03	4.16	8.19
123. Ill	2	2.87	6.36	3.69
124. Ill-at-ease	1	3.37	5.63	5.04
125. Impressed	2	8.58	7.29	6.10
126. In agony	2	2.85	6.55	5.88
127. In anguish	1	3.99	3.72	5.81
128. Infatuated	2	8.49	6.64	5.71
129. Injured	2	2.94	6.59	3.05
130. In love	2	8.52	5.80	5.01
131. In pain	2	4.77	4.36	4.14
132. Insecure	4	3.19	5.84	6.73
133. Inspired	2	8.32	7.51	5.07
134. Insulted	3	3.35	5.29	8.19
135. Intimate	3	9.39	5.28	3.90

Adjective	HL[a]	Dimensions		
		1	2	3
136. Intimidated	2	3.28	6.59	6.72
137. Irked	2	3.96	8.32	6.08
138. Irritated	2	3.48	6.07	6.64
139. Itchy	3	5.35	4.42	8.64
140. Jealous	2	4.04	5.40	7.42
141. Joyful	2	10.98	6.16	6.89
142. Joyless	2	3.20	4.78	5.78
143. Joyous	4	11.06	5.75	6.45
144. Jubilant	2	10.20	5.51	6.05
145. Lonely	1	3.86	3.77	4.05
146. Lonesome	1	4.24	4.83	6.06
147. Lousy	2	3.53	4.55	4.88
148. Loved	2	11.49	6.24	5.73
149. Lovesick	3	4.73	3.32	5.81
150. Low	2	2.62	4.67	5.29

Adjective	HL[a]	Dimensions		
		1	2	3
151. Lucky	2	9.42	5.70	5.39
152. Mad	2	4.48	6.02	8.74
153. Maddened	3	3.70	5.50	7.45
154. Melancholy	2	5.00	2.50	4.98
155. Merry	4	10.81	6.77	5.80
156. Miserable	1	2.58	4.77	5.05
157. Mistreated	1	3.10	7.25	5.41
158. Mournful	3	3.15	4.44	3.09
159. Nauseated	1	3.15	4.64	5.10
160. Nauseous	2	2.90	5.45	5.53
161. Needed	2	6.71	5.54	0.10
162. Neglected	2	5.12	3.12	5.71
163. Numb	2	5.74	4.30	3.36
164. Offended	1	3.95	3.93	6.85
165. Oppressed	2	3.38	4.76	6.08

Adjective	HL[a]	Dimensions		
		1	2	3
166. Outraged	3	5.56	5.82	9.86
167. Overjoyed	2	10.32	7.40	5.39
168. Overstuffed	4	6.89	5.34	2.01
169. Overwhelmed	4	7.36	7.36	3.84
170. Overworked	3	3.88	4.07	7.16
171. Pained	1	3.96	4.18	5.77
172. Passionate	2	8.54	6.64	5.11
173. Peeved	2	3.00	6.75	6.81
174. Persecuted	1	4.06	7.33	7.60
175. Petrified	1	3.20	7.72	3.18
176. Plagued	1	3.47	4.96	4.81
177. Pleased	4	10.65	5.52	6.39
178. Pressed	2	3.76	6.06	4.86
179. Protected	1	9.94	4.38	5.36
180. Reassured	3	10.20	4.77	5.09

Adjective	HL[a]	Dimensions		
		1	2	3
181. Refreshed	4	9.52	6.02	5.71
182. Regretful	3	3.57	5.17	6.24
183. Rejected	1	3.47	4.33	5.42
184. Relaxed	4	9.35	3.41	5.90
185. Rested	4	10.20	4.17	5.95
186. Revived	3	9.72	5.90	6.47
187. Sad	1	3.76	3.87	5.88
188. Safe	3	9.52	2.32	6.02
189. Satisfied	2	10.54	5.57	5.69
190. Scared	2	3.66	8.99	6.61
191. Secure	1	11.00	5.92	5.88
192. Self-satisfied	1	8.69	4.36	6.77
193. Sentimental	2	8.50	4.96	4.77
194. Shaken	3	3.17	8.99	3.86
195. Shamed	2	3.47	4.97	7.72

Adjective	HL[a]	Dimensions		
		1	2	3
196. Shattered	2	3.92	5.47	5.55
197. Shocked	1	5.32	8.90	5.69
198. Sick	1	3.57	4.80	2.61
199. Sick at heart	1	3.81	3.82	2.82
200. Sickened	2	3.50	5.56	4.24
201. Sleepy	4	6.50	2.20	3.88
202. Slighted	3	3.15	5.22	6.32
203. Soothed	3	9.32	3.37	4.21
204. Sore	1	3.89	4.48	6.61
205. Sore at heart	1	4.70	3.80	4.80
206 Sorrow-burdened	2	3.40	3.78	4.32
207. Sorrowful	2	3.60	4.51	3.06
208. Sorrow-laden	2	4.25	3.42	3.72
209. Sorrow-stricken	1	3.22	3.19	4.88
210. Sorrow-worn	2	3.19	4.89	5.63

Adjective	HL[a]	Dimensions		
		1	2	3
211. Sorry	1	4.32	5.25	4.70
212. Startled	4	4.39	10.82	4.62
213. Starved	1	5.33	3.22	6.97
214. Stunned	1	5.11	7.68	3.03
215. Suffering	1	4.20	4.22	3.22
216. Suffocated	3	3.35	6.68	4.57
217. Suppressed	1	3.66	5.87	4.99
218. Sure	1	8.16	4.27	6.21
219. Surprised	1	6.63	9.00	4.10
220. Sympathetic	4	5.54	3.94	0.19
221. Tense	2	3.13	7.28	5.99
222. Terrified	3	3.02	7.54	5.24
223. Terrorized	4	2.84	9.05	5.64
224. Thankful	1	9.83	4.18	4.95
225. Thirsty	4	5.81	4.43	5.63

Adjective	HL[a]	Dimensions		
		1	2	3
226. Thrilled	2	10.77	6.21	5.73
227. Tickled	4	8.84	7.81	4.86
228. Tingly	3	6.73	8.21	4.49
229. Tired	4	5.16	3.51	4.94
230. Tormented	2	3.53	5.74	6.96
231. Tortured	2	3.06	7.30	7.46
232. Touched	4	7.48	6.20	4.63
233. Triumphant	3	9.69	7.35	4.96
234. Troubled	3	3.05	5.56	6.06
235. Unassured	3	4.46	5.11	5.53
236. Uncared for	3	4.51	4.58	6.59
237. Uncomfortable	2	2.79	6.20	4.83
238. Uncontented	1	3.82	4.76	5.96
239. Uncontent	2	2.92	5.65	5.36
240. Undistressed	3	7.93	3.66	7.21

Adjective	HL[a]	Dimensions		
		1	2	3
241. Unfrightened	3	7.45	1.74	7.57
242. Unfulfilled	1	1.91	4.20	5.68
243. Unglad	1	3.91	4.58	6.11
244. Unhappy	2	2.67	4.89	5.93
245. Unimportant	4	5.70	4.16	7.13
246. Unjoyful	1	5.87	4.28	7.32
247. Unjoyous	1	5.21	6.13	6.69
248. Unpleased	1	3.45	4.76	4.90
249. Unprotected	4	3.86	6.02	7.72
250. Unsatisfied	2	3.89	4.91	5.95
251. Untroubled	3	9.39	4.65	5.70
252. Unworried	1	8.80	4.90	3.62
253. Upset	1	4.77	5.81	6.06
254. Useless	1	6.76	4.50	6.33
255. Wanted	3	7.44	5.82	7.38
256. Warm	1	9.71	5.97	5.32
257. Weary	2	4.51	4.42	3.00
258. Welcome	3	10.49	4.50	6.40
259. Well	1	9.59	5.32	6.66
260. Well-satisfied	2	9.08	2.91	7.63
261. Woeful	1	4.71	2.67	4.48
262. Woe-stricken	2	3.96	4.61	4.05
263. Worried	1	2.09	6.58	4.64
264. Wounded	2	4.29	3.46	3.80

[a] Highest level of the design reached in either replication.

Modes occur at 3.4 and 9.5 approximately. An area of inflection extends roughly between 6.1 and 7.9, which includes the upper quartile of the distribution. It should be remembered that the mean of the dimension (5.5) is not necessarily the neutral point between positive and negative feelings and that the area of inflection, subject to further research, is probably a better indication of where this neutral point is. If so, the dominant trend of English (Johnson, 1966) is reversed where adjectives denoting feelings are concerned: negative words outnumbering positive words 3:1. Dimension 1 has a standard deviation of 2.70 and accounts for 62.9% of the total variance of the MDSADF (defined as the trace of the dispersion matrix, which in this case approaches diagonal form, off-diagonal elements being less than $|.27|$). The standard deviation should be interpreted with caution because of the bimodal distribution of scale values.

Dimension 2 of the MDSADF appears to be the traditional Level of Activation dimension. Some of the adjectives at the high end of the scale are <u>startled</u>, <u>alarmed</u>, <u>horror-stricken</u>, <u>aroused</u>; and at the low end, <u>sleepy</u>, <u>safe</u>, <u>bored</u>, and <u>glum</u>. Scale values on the dimension have a unimodal distribution, though somewhat irregular and asymmetric, with a range from 1.74 to 10.82 and a median of 5.2. The mode occurs at about 4.8. Dimension 2 has a standard deviation of 1.60 and accounts for 21.2% of the total variance.

Dimension 3 of the MDSADF, though somewhat less clear than Dimensions 1 and 2, seems to scale Level of Aggression in its broadest psychological meaning. Some of the adjectives with high scale values are outraged, furious, enraged, mad, breathless, ignored, and insulted. Some of those with low values are needed, sympathetic, desperate, heartened, overstuffed, drowsy, and sick. It is helpful to note that adjectives like joyful, happy, and delighted carry moderately high scale values on Dimension 3 in addition to their high scale values on Dimension 1. The distribution of scale values on Dimension 3 is nearly unimodal and symmetric, ranging from 0.10 to 9.86 with a median of 5.7. The mode occurs at about 5.8. Dimension 3 has a standard deviation of 1.49 and accounts for 18.3% of the total variance.

Error in the MDSADF can be partitioned into the goodness of fit of the INDSCAL derived solution to individual subjects' data and the estimated reliability of MDSADF dimensions from R-scale cross-correlations. The evidence for goodness of fit is presented in Table 6. The median MDSADF-data correlation is .62 with a range of .04 to .86. The evidence for reliability is presented in Table 7. Because of the hierarchical nature of the design, we might expect adjectives entering the analysis only at the lower levels to be less reliable than those at higher levels, which seems to be true for the most part. As can be seen from the table, Dimension 1 has quite satisfactory

Table 6

Goodness of Fit of MDSADF to Individual Subjects' Data

Distribution of Correlations

Between Predicted and Obtained Scalar Products

Correlation	Frequency	Cumulative frequency	Cumulative proportion
.44 or less	83	83	.11
.45 - .49	38	121	.16
.50 - .54	72	193	.25
.55 - .59	89	282	.37
.60 - .64	153	435	.57
.65 - .69	142	587	.77
.70 - .74	109	696	.91
.75 - .79	46	742	.97
.80 - .84	18	760	.99
.85 - .89	2	762	1.00

Table 7

Reliability of MDSADF Dimensions by Level[a]

Level	All adjectives at level[b]				Adjectives eliminated at level[b]			
	No.	Dimensions			No.	Dimensions		
		1	2	3		1	2	3
1	264	.907	.634	.360	88	.860	.531	.208
2	176	.927	.666	.412	98	.927	.562	.394
3	78	.925	.762	.446	42	.920	.630	.280
4	36	.930	.836	.506	36	.930	.836	.506

[a] Estimated from the cross-correlations of R scales using Horst's (1966) formula for a weighted sum of measures--weights equal to .5.

[b] In either replication.

reliability; Dimension 2, only fair; and the reliability of Dimension 3 is clearly marginal. It might be possible to raise the effective reliability of Dimension 2 by selecting adjectives only from Level 3 and 4 of the design, and of Dimension 3 by selecting from Level 4. But further research designed to improve the reliability of these dimensions would seem indicated.

Correlations between MDSADF dimensions were very low, less than $|.07|$, suggesting a considerable amount of linear independence. Quadratic relationships between dimensions were also computed and a significant relationship ($P = .01$, $F = 6.93$, $DF = [1,261]$) between the square of Dimension 2, with linear effect partialed out, and Dimension 3 emerged (Eta = .161). The importance of this relationship appears small but considering the low reliability of Dimension 3, is worth noting. The relationship suggests that extremes of activation and deactivation are associated with lower levels of aggression.

Moderately large differences in the perception of feelings were found. The standard deviations of subject weights around a mean of 1.0 for Dimensions 1, 2, and 3 respectively were .323, .524, and .601. The meaning of these differences must wait further research, but a preliminary test of their importance was carried out using the major subject classifications, race, sex, and grade. A multivariate analysis of variance revealed no significant

interactions or main effects except the main effect for race, which is presented in Table 8. The discriminant function for this effect suggests that white students stress the pleasantness or unpleasantness of a feeling and, to a lesser degree, its level of activation more than do black students.

Discussion

Dimension 1 of the MDSADF, Pleasantness-Unpleasantness, has a long history in psychology, going back at least as far as Wundt (1897). For a time it was considered the only dimension of feelings. It has regularly appeared in multidimensional scales of feeling derived from facial expression (Abelson & Sermat, 1962; Engen et al., 1957, 1958; Gladstones, 1962; Osgood, 1955, 1966; Schlosberg, 1952, 1954). And it appears to be directly related to, if not identical with, the principal dimension (Evaluation) of the semantic differential. It has not appeared, however, in any recognizable form in factor analyses of self-reports of feelings (Borgatta, 1961; Clyde, 1963; Lorr et al., 1967; McNair & Lorr, 1964; Nowlis & Green, 1957, 1964, 1965). What have appeared are two factors representing each pole of the dimension: using Nowlis and Green's (1965) factors as examples, Sadness (regretful, sad, sorry . . .) and Elation (elated, overjoyed, pleased . . .).

Table 8

Multivariate Analysis of Variance

for Main Effect of Race on Subject Weights

Entity tested	F	Degrees of freedom		Prob. less than	R	Discriminant function coefficients
		HYP	Error			
Multivariate analysis						
Root 1	20.5[a]	3	744	.001	.276	----
Univariate analyses						
Dimension 1	45.5	1	746	.001	.237	.796
Dimension 2	23.4	1	746	.001	.171	.514
Dimension 3	0.2	1	746	----	----	.030

[a] Based on Wilks lambda criterion.

Dimension 2 of the MDSADF, Level of Activation, also dates back to Wundt (1897). His terminology (in translation) was "arousing and subduing (exciting and depressing feelings)[p. 83]." Like Pleasantness-Unpleasantness, it has regularly appeared in scales of facial expression. Abelson and Sermat (1962) and Gladstones (1962) in fact showed that Level of Activation in Schlosberg's three dimensional scale (1954) made his Attention-Rejection dimension redundant. Dimension 2 also has an obvious parallel to the activity dimension of the semantic differential. A difference between what is being scaled by Dimension 2 and what activation theorists mean by activation (Cofer & Appley, 1964) exists in the intermediate position on the dimension of angry or aggressive feelings. Activation theorists would expect high values.

Studies of self-report have not for the most part found a single factor which could be interpreted as Level of Activation. Thayer (1967), in an attempt to define such a factor, found four which he interpreted as four distinct levels of activation. Howard and Hill (1967) reported a factor with anxious, tense, (not) calm as highest loading variables. The usual result, however, has been two factors, defined roughly by the endpoints of Dimension 2: again using Nowlis and Green's (1965) factors as examples, Anxiety (clutched up, fearful, jittery . . .) and Fatigue (drowsy, dull, sluggish, tired . . .). Zuckerman (1960)

developed a checklist to measure anxiety empirically. His anxiety plus items (afraid, desperate, fearful . . .) have high values on Dimension 2 but differ from his anxiety minus items (contented, happy, joyful . . .) principally in their values on Dimension 1. Anxiety, of course, is a legitimately different construct from Level of Activation and, in terms of the present study, may well be some combination of Dimensions 1 and 2.

Dimension 3 of the MDSADF, Level of Aggression, does not have the same tradition of interpretation behind it as Pleasantness-Unpleasantness or Level of Activation. It seems to have some relationship to Wundt's (1897) "strain and relaxation [p. 83]," but the adjectives tense and relaxed have their principal scale values in the present study on Dimension 2. Osgood (1966) labels the second of his dimensions of communication via facial expression Control, which has some plausibility as an interpretation of Dimension 3. However, the pattern of scale values on Osgood's Control dimension suggests it would be better interpreted as Level of Activation and identified with Dimension 2. Perhaps the only clear parallel between Dimension 3 and dimensions in other studies is to Potency of the semantic differential. The difference between words high on Dimension 3 and those low on the dimension seems to be arousal for defense and autonomy (outraged, enraged, furious . . . sick, sympathetic, desperate, needed), which

is interpersonal potency by most definitions.

A factor called Aggression or Anger-Hostility has appeared repeatedly in factorings of self-reports but without a factor clearly representing the opposite end of Dimension 3: from Lorr et al. (1967), Anger-Hostility (furious, annoyed, angry . . .). Items keyed empirically by Zuckerman, Lubin, Vogel, and Valerius (1964) for hostility, where they are present on the MDSADF, have appropriate scale values on Dimension 3, excepting discontented and disgusted: hostility plus (angry, bitter, enraged, furious . . .); hostility minus (sympathetic). Perhaps it should be mentioned that Zuckerman et al.'s (1964) remaining scale, Depression, seems to have most relationship with Dimension 1.

The evidence for the dimensionality and structure of feelings developed by the present study is clearly more supportive of the facial expression tradition than of the self-report tradition. One source of the difference between self-report studies and the present study are differences between the sets of adjectives scaled. The study reported in Part II of this report included all of the adjectives used in self-report studies in the initial list of 2186 adjectives. So differences between the set used in the present study and those used by self-report studies can only be due to college students having judged many of the adjectives in self-report studies not to denote feelings as

contrasted with behavior and personality (i.e., the stable traits of a person). In fact, many of the factors defined in self-report studies sound more like personality or behavior factors: from Nowlis and Green (1965), Surgency (carefree, playful, witty . . .), Concentration (attentive, earnest, serious . . .), Social Affection (affectionate, forgiving, kindly . . .), Skepticism (dubious, skeptical, suspicious . . .), Egotism (egotistic, self-centered, aloof . . .), Nonchalance (leisurely, nonchalant . . .).

Several methodological considerations might also account for discrepancies between studies of self-report, on the one hand, and studies of facial expression and the present study, on the other. First, all of the self-report studies except Howard and Hill (1967) correlate adjectives across subjects at a point in time. The variance being analyzed is inter-individual variance and would likely contain stable personality (trait) factors as well as feeling (state) factors. Second, all of the studies assume subjects use a vector model in responding to the adjectives rather than an ideal point model (Coombs, 1964), hence the use of correlation and factor analysis rather than multidimensional unfolding. If that assumption were incorrect, clusters of variables would emerge as independent factors. Third, most studies utilized oblique factoring techniques and reported moderate intercorrelations between factors. But no second order factorings were carried out, so it is

impossible to determine whether a structure congruent to studies of facial expression and the present study might have emerged at the second order.

It is of course possible that self-reports of feelings are inherently more complex than judgments of similarity in adjectives denoting feelings or facial expression. But parsimony would argue for the simpler structure until research proves a need for greater complexity. An interpretive advantage of the dimensions defined by the present study is their relationship to individual differences in perception. The significant effect of race on subject weights is important in holding out the promise of other systematic relationships among these differences. Some relationship to traits of personality seems likely. The present study also opens up the possibility of investigating the model underlying self-reports of feelings, noted above as a potential source of discrepant results, as Cliff has done with self-descriptions (Cliff, 1958; Cliff, Bradley, & Girard, 1970).

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APPENDIX A

POTENTIAL ADJECTIVES DENOTING FEELINGS

POTENTIAL ADJECTIVES DENOTING FEELINGS

Abandoned
Abashed
Aberrant
Abject
Able
Abnormal
Abominable
Abrasive
Absolved
Absorbed
Absurd
Abused
Accepted
Accessible
Accessory
Accomodating
Accountable
Acquiescent
Acquisitive
Acrid
Acrimonious
Active
Acursed
Acute
Adamant
Addlebrained
Addleheaded
Addlepated
Adept
Admired
Adolescent
Adored
Adoring
Adroit
Adventurous
Affable
Affected
Affectionate
Afflicted
Affluent
Affronted
Afraid
Agape
Aggravated
Aggressive
Aggrieved
Aghast
Agile
Agitated
Agnostic
Agreeable
Airy
Alacritous
Alarmed
Alert
Alien
Alienated
Alive
All in
All-powerful
Alone
Aloof
Altruistic
Amazed
Ambitious
Amenable
Amiable
Amicable
Amorous
Amused
Anesthetized
Angered

Angry
Anguished
Animated
Annoyed
Anomalous
Answerable
Antagonistic
Antisocial
Anxious
Apathetic
Apologetic
Appeased
Appeasing
Appreciated
Appreciative
Apprehensive
Ardent
Aroused
Arrested
Arrogant
Artless
Ashamed
Asinine
Asocial
Asphyxiated
Aspiring
Assaultive
Assiduous
Assuming
Assured
Astonished
Astounded
Astute
At ease
Athirst
Athrill
At peace
At rest
Atrocious
Attached
Attentive
Attractive
Atypical
Audacious
Authentic
Authoritarian
Autistic
Autonomous
Avaricious
Averse
Avid
Avoided
Awake
Awed
Awe-struck
Awful
Awkward
Backward
Bad
Badgered
Baffled
Balked
Barbarous
Barefaced
Barren
Barred
Base
Bashful
Beastly
Bedeviled
Bedraggled
Beefwitted
Beetleheaded
Beggarly
Begrudging
Beguiled
Bellicose
Belligerent

Beloved
Bemused
Beneficient
Benevolent
Benign
Benignant
Benumbed
Bereft
Beset
Besotted
Better
Bewildered
Bewitched
Bighearted
Birdbrained
Bitter
Bizarre
Blamable
Blameless
Blameworthy
Bland
Blandished
Blank
Blase
Blasted
Blazing
Bleak
Blighted
Blissful
Blithe
Blocked
Blockheaded
Blockish
Bloodthirsty
Blooming
Blue
Boastful
Bold
Bored
Bothered
Bouncy
Bound
Boyish
Braced
Brave
Brazen
Breathless
Breezy
Bridled
Bright
Brilliant
Brittle
Broad-minded
Broken
Brokenhearted
Broody
Brutal
Brutish
Bubbly
Buoyant
Burning
Business-like
Busy
Buttressed
Callous
Calm
Candid
Can't concentrate
Callow
Capable
Capricious
Captious
Captivating
Carefree
Careful
Careless
Carried away
Casual

Caustic
Cautious
Censurable
Censured
Certain
Chagrined
Chained
Changeable
Chaotic
Characterless
Charitable
Charmed
Charming
Chary
Chaste
Chatty
Cheap
Checked
Checkmated
Cheered
Cheerful
Cheerless
Cheery
Cherished
Childish
Chipper
Choleric
Chuckleheaded
Churlish
Circumscribed
Circumspect
Civil
Clean
Clear-thinking
Clever
Clingy
Cloddish
Close
Closed
Closefisted
Close-mouthed
Cloudy
Cloyed
Clumsy
Clutched up
Cock-sure
Cocky
Cold
Cold-blooded
Collected
Combative
Committed
Common
Companionable
Companionless
Compassionate
Compelled
Competent
Complacent
Complaining
Complaisant
Complete
Compliant
Composed
Compunctious
Conceited
Concentrating
Concerned
Conciliated
Conciliatory
Condescending
Condemnable
Confident
Confined
Confirmed
Conflicted
Confounded
Confused

Congenial
Conscience-stricken
Conscientious
Conscious
Consequential
Considerate
Consoled
Conspicuous
Constant
Consternated
Constrained
Constricted
Contained
Contemplative
Contemptible
Contemptuous
Content
Contented
Contrary
Contrite
Controlled
Convinced
Convincing
Convivial
Cool
Coolheaded
Cooperative
Cordial
Corpulent
Corrected
Corrupt
Corrupted
Countenanced
Courageous
Covetous
Cowardly
Cowed
Coy
Cozy
Crabby
Cramped
Cranky
Crazed
Crazy
Creditable
Creepy
Crestfallen
Crippled
Critical
Cross
Crotchety
Crucified
Crude
Cruel
Cruel-hearted
Crushed
Culpable
Curious
Cursed
Cynical
Dandy
Daring
Dashed
Dashing
Daunted
Dazed
Deathly
Debilitated
Debonair
Decisive
Dedicated
Defeated
Defective
Deferent
Deferential
Defiant
Deficient
Definite

Deflated
Degraded
Dejected
Delectable
Deliberate
Deliberative
Delighted
Delightful
Delinquent
Delirious
Deluged
Demented
Demonstrative
Demoralized
Demure
Dense
Dependent
Depraved
Deprecatory
Depredated
Depressed
Deprived
Deranged
Derelict
Derisive
Desensitized
Deserving
Desirable
Desirous
Desolate
Despairing
Desperate
Despicable
Despised
Despondent
Despotic
Despotized
Destitute
Destroyed
Detached
Deterred
Determined
Detestable
Devastated
Deviled
Devilish
Devine
Devoted
Dexterous
Diffident
Dignified
Diligent
Dim-witted
Dingy
Dirty
Disabled
Disabused
Disaffected
Disagreeable
Disappointed
Disapproving
Disarmed
Disarrayed
Disbelieving
Discerning
Disciplined
Discomfited
Discomposed
Disconcerted
Disconsolate
Discontented
Discountenanced
Discouraged
Discredited
Discreet
Disdainful
Diseased
Disenchanted

Disgraced
Disgruntled
Disgusted
Disheartened
Disheveled
Disillusioned
Disinclined
Disinterested
Disliked
Dislodged
Dismal
Dismayed
Disobeyed
Disobliging
Disordered
Dispassionate
Dispirited
Displeased
Displeasing
Dispossessed
Disregarded
Disregardful
Disregardant
Dissatisfied
Dissipated
Dissolute
Distant
Distasteful
Distinguished
Distractable
Distraught
Distressed
Distrustful
Disturbed
Diverted
Dizzy
Docile
Dogged
Doleful
Dolorous
Doltish
Dominant
Doomed
Doubtful
Dowdy
Downcast
Down-hearted
Dozy
Drab
Draggy
Dreadful
Dreamy
Dreary
Driven
Droopy
Drowsy
Drubbed
Drugged
Drunk
Dry
Dubious
Dull
Dull-witted
Dumb
Dumbfounded
Dunderheaded
Dutiful
Eager
Earnest
Earthy
Easy
Easygoing
Ebullient
Ecstatic
Effective
Effeminate
Effervescent
Effete

Efficient
Effulgent
Egocentric
Egotistic
Egotistical
Ejected
Elated
Electrified
Elegant
Elevated
Elfin
Eligible
Emaciated
Embarrassed
Embittered
Empathetic
Employed
Empty
Empty-headed
Empty-minded
Empty-pated
Empty-skulled
Enamored
Enchanted
Enchanting
Encouraged
Energetic
Energyless
Enervated
Engaged in thought
Engaging
Engrossed
Engulfed
Enjoyed
Enlivened
Enraged
Enrapt
Enraptured
Enterprising
Entertained
Enthralled
Enthused
Enthusiastic
Enticed
Enviable
Envious
Erotic
Essential
Esteemed
Estranged
Euphoric
Evicted
Evil
Exalted
Exasperated
Excellent
Exceptional
Excited
Excusatory
Excused
Exempt
Exercized
Exhausted
Exhilarated
Expansive
Expectant
Expelled
Experienced
Exposed
Extraordinary
Extravagant
Exuberant
Exultant
Fabulous
Faint
Fainthearted
Fair
Fair-minded

Faithful
Familiar
Famished
Famous
Fanatical
Fanciful
Fantastic
Fascinated
Fatalistic
Fatherly
Fatigued
Fatuous
Favorable
Favorably inclined
Favored
Fearful
Featherbrained
Fed
Fed-up
Feeble
Feeble-minded
Feeble-witted
Feminine
Ferocious
Fervent
Fervid
Festive
Fettered
Feverish
Fickle
Fierce
Fiery
Filthy
Fine
Firm
Fit
Flabbergasted
Flighty
Flooded
Flushed
Foggy
Foiled
Foolish
Forbearing
Forceful
Foreign
Forestalled
Forgiven
Forgiving
Forlorn
Formal
Formidable
Fortified
Fortunate
Forward
Fostered
Foul
Fragile
Frail
Frank
Frantic
Freakish
Free
Free-handed
Frenetic
Frenzied
Fresh
Fretful
Friendless
Friendly
Frightened
Frigid
Frisky
Frivolous
Frolicsome
Frowzy
Frustrated
Fulfilled

Full
Full of pep
Full of pity
Fuming
Funny
Furious
Furtive
Gabby
Gagged
Galled
Galvanized
Galvanic
Game
Gauche
Gawky
Gay
Generous
Genial
Genteel
Gentle
Genuine
Ghastly
Giddy
Girlish
Glad
Gladdened
Gleeful
Gloomy
Glorified
Glorious
Glowing
Glum
Glutted
Gluttonous
Godless
Good
Good-hearted
Good-humored
Good-natured
Gorged
Graceful
Gracious
Grand
Grandiose
Grasping
Grateful
Gratified
Grave
Great
Greedy
Green
Gregarious
Grief-stricken
Grief-laden
Grieved
Grim
Grisly
Groggy
Gross
Grotesque
Grouchy
Grudging
Gruff
Grumbly
Grumpy
Guarded
Guileless
Guiltless
Guilty
Haggard
Hale
Halfbaked
Halfhearted
Half-witted
Halting
Handcuffed
Hapless
Happy

Harassed
Hard
Hardbitten
Hardboiled
Hardfisted
Hardhanded
Hardhearted
Hardy
Hare-brained
Harried
Harsh
Hateful
Haughty
Hazy
Headstrong
Healthy
Heavenly
Heartbroken
Heartened
Heartless
Heartsick
Heartsore
Heart-stricken
Hearty
Heavy
Heavyhearted
Heedful
Heedless
Held back
Hellish
Helpful
Helpless
Heroic
Hesitant
Hideous
High
Highminded
Highspirited
Hilarious
Hindered
Hobbled
Hoggish
Homely
Homesick
Honored
Hopeful
Hopeless
Honest
Horny
Horrible
Horrid
Horrified
Horror-stricken
Hospitable
Hostile
Humane
Humanitarian
Humble
Humiliated
Humored
Humorous
Hungry
Hurried
Hurt
Hysterical
Idiotic
Idolatrous
Idolized
Ignoble
Ignominious
Ignored
Ill
Ill-advised
Ill-at-ease
Ill-fated
Illiberal
Ill-natured
Ill-omened

Ill-starred
Ill-treated
Ill-used
Illustrious
Imbecilic
Immature
Immersed
Immoderate
Immodest
Immoral
Immovable
Immune
Impaired
Impassive
Impartial
Impatient
Impelled
Impenitent
Imperceptive
Imperfect
Impertinent
Imperturbable
Impetuous
Impish
Impolitic
Important
Importuned
Imposing
Impotent
Impoverished
Impregnable
Impressed
Impressionable
Impressive
Improficient
Improvident
Imprudent
Impudent
Impulsive
Impure
Inaccessible
Inactive
Inadept
Inadequate
Inaffable
In agony
Inane
In anguish
Inattentive
Incapable
Incautious
Incensed
Incisive
Incompetent
Incomplete
Inconstant
Incredulous
Indecent
Indecisive
Indefatigable
Indefinite
Independent
Indifferent
Indignant
Indiscrete
In disfavor
Indisposed
Indolent
Indomitable
Indulged
Indulgent
Industrious
Inebriated
Ineffectual
Inefficient
Inelegant
Inept
Inert

Inexpedient
Inexperienced
Infallible
Infatuated
Infected
Infelicitous
Inferior
Infertile
Inflamed
Inflated
Inflexible
Ingenious
Ingenuous
Ingratiatory
Inhibited
Inhuman
Inimical
Injudicious
Injured
In love
Innocent
Innundated
In pain
Inquisitive
Insane
Insatiable
Insecure
Insensible
Insightful
Insignificant
Insipid
Insolent
Insouciant
Inspired
Insubmissive
Insufficient
Insulted
Insulting
Intact
Intelligent
Intemperate
Intense
Intent
Interested
Intimate
Intimidated
Intoxicated
Intractable
Intransigent
Intrepid
Introspective
Introverted
Intuitive
Inveigled
Invigorated
Invincible
Invited
Involved
Irascible
Irate
Ireful
Irked
Irksome
Irrational
Irresistible
Irresolute
Irrestrainable
Irreverent
Irritable
Irritated
Isolated
Itchy
Jaded
Jarred
Jaundiced
Jaunty
Jealous
Jittery

Jocular
Jocund
Jolly
Jolted
Jounced
Jovial
Joyful
Joyless
Joyous
Jubilant
Judicious
Jumpy
Juvenile
Keen
Kept
Kind
Kindly
Knocked out
Lackadaisical
Lanquid
Lanquorous
Lascivious
Lassitudinous
Late
Laudable
Laughable
Lax
Lazy
Leaden
Lecherous
Leisurely
Lenient
Lethargic
Level
Levelheaded
Lewd
Liable
Liberal
Libidinous
Licentious
Lifeless
Lightheaded
Lighthearted
Liked
Limited
Listless
Lively
Loathsome
Loathing
Lofty
Loggerheaded
Logical
Lonely
Lonesome
Loose
Lordly
Lost
Lost in amazement
Lost in thought
Lost in wonder
Lousy
Lovable
Loved
Lovelorn
Lovely
Lovesick
Loving
Low
Lowly
Loyal
Lucid
Lucky
Ludicrous
Lugubrious
Lunkheaded
Lustful
Lusty
Lyrical

Mad
Maddened
Magnanimous
Magnificent
Maintained
Majestic
Maladjusted
Maladroit
Malcontent
Malevolent
Malicious
Malignant
Malleable
Manacled
Manic
Manly
Marrowless
Marvelous
Masculine
Mature
Maudlin
Mean
Mean-minded
Mean-tempered
Meditative
Meek
Melancholic
Melancholy
Mellow
Menial
Merciful
Merciless
Meritorious
Merry
Methodical
Meticulous
Mighty
Mild
Mindful
Minor
Mirthful
Mirthless
Misapplied
Mischievous
Misemployed
Miserable
Miserly
Misguided
Mistreated
Misty
Mocking
Modest
Mollified
Mollifying
Monstrous
Moody
Mopy
Moral
Morbid
Moronic
Morose
Mortified
Motherly
Motivated
Mournful
Mousy
Moved
Mucky
Muddled
Muddleheaded
Muffled
Munificent
Museful
Mutable
Mutinous
Muzzled
Mystified
Nagged

Naive
Naked
Narcissistic
Narcotized
Narrow-minded
Nasty
Natural
Naughty
Nauseated
Nauseous
Neat
Necessary
Needed
Needy
Negative
Neglected
Neglectful
Negligent
Neighborly
Nerveless
Nervous
Nervy
Nettled
Neurotic
Neutral
Nice
Nihilistic
Noble
Nonbelligerent
Nonchalant
Noncritical
Nondescript
Nongregarious
Nonplussed
Nonsensical
Normal
Nostalgic
Nourished
Numb
Nurtured
Oafish
Obdurate
Obedient
Objectionable
Objective
Obliging
Oblivious
Obscene
Obsequious
Observant
Obsessed
Obstinate
Obstructed
Obtuse
Occupied
Odd
Offended
Old
Omnipotent
Opaque
Open
Open-handed
Open-hearted
Open-minded
Openmouthed
Oppressed
Optimistic
Opulent
Orderly
Ornery
Ousted
Outraged
Outstanding
Overawed
Overcome
Overconfident
Overenthusiastic
Overfed

Overgorged
Overjoyed
Overmodest
Overpermissive
Overpowered
Overrun
Overstuffed
Overweight
Overwhelmed
Overworked
Overwrought
Overzealous
Pacific
Pacificatory
Pacified
Pacifistic
Pained
Painstaking
Pampered
Panicked
Panicky
Paralyzed
Parched
Pardoned
Passionate
Passionless
Pathetic
Patient
Patronizing
Peaceable
Peaceful
Peace-loving
Peculiar
Peeved
Peevish
Penalized
Penetrating
Penitent
Pensive
Peppery
Perceptive
Perky
Permissive
Perplexed
Persecuted
Persevering
Persistent
Perspicacious
Persuasive
Perturbed
Perverse
Perverted
Pesky
Pessimistic
Pestered
Petrified
Petty
Petulant
Phenomenal
Philanthropic
Philosophical
Phlegmatic
Phobic
Picayune
Picayunish
Piggish
Pigeonholed
Pinched
Pinioned
Piqued
Pitiable
Pitiful
Pitiless
Placated
Placatory
Placid
Plagued
Plain

Playful
Pleasant
Pleased
Plebian
Pliable
Pliant
Poised
Poky
Politic
Polite
Pompous
Ponderous
Popular
Poor
Positive
Possessive
Potent
Powerful
Powerless
Practiced
Praiseworthy
Preferred
Preoccupied
Pressed
Pressured
Pretentious
Prevented
Prim
Princely
Principled
Privledged
Prized
Prodded
Prodigal
Prodigious
Proficient
Profligate
Prominent
Promiscuous
Proper
Propitiated
Propitiatory
Prosperous
Prostituted
Prostrate
Protected
Proud
Provided for
Provincial
Provoked
Prudent
Prudish
Puckish
Pugnacious
Punchy
Punctilious
Punished
Puritanical
Pushed
Pusillanimous
Puzzled
Qualified
Quashed
Queasy
Quelled
Querulous
Quick
Quiet
Quixotic
Quizzical
Rabid
Racked
Racy
Radical
Raging
Rampageous
Rampant
Rancorous

Rankled
Rapacious
Raped
Rapt
Rapturous
Rascally
Rash
Rational
Rattled
Rattlebrained
Rattleheaded
Rattlepated
Rattleskulled
Ravenous
Ravished
Reachable
Ready
Ready to fight
Real
Reanimated
Reassured
Rebellious
Rebuffed
Recalcitrant
Reckless
Redintegrated
Reflective
Refractory
Refreshed
Regal
Regardful
Regenerated
Regretful
Rehabilitated
Reinforced
Reinvigorated
Rejected
Rejuvenated
Relaxed
Relentless
Reluctant
Remarkable
Remiss
Remorseful
Remorseless
Remote
Removed
Renewed
Reorganized
Repelled
Repentant
Replete
Reprehensible
Reproached
Reproachful
Reproved
Repugnant
Repulsed
Repulsive
Resentful
Reserved
Resistant
Resistive
Resolute
Resourceful
Respectful
Responsible
Rested
Restive
Restless
Restored
Restrained
Restricted
Resurrected
Resuscitated
Retentive
Reticent
Retiring

Revealed
Revengeful
Revered
Reverent
Reverential
Reviled
Revitalized
Revived
Revivified
Revolted
Rhapsodic
Ribald
Rich
Ridiculed
Ridiculous
Right
Righteous
Rigid
Rigorous
Riled
Ripe
Risque
Rocky
Roguish
Romantic
Rompish
Rompy
Rosy
Rotund
Rough
Routed
Rude
Rueful
Ruffled
Rugged
Ruined
Ruminative
Rushed
Ruthless
Sad
Sadistic
Safe
Saggy
Sane
Sanguine
Sapheaded
Sapless
Sarcastic
Sardonic
Satiated
Satisfied
Saturnine
Saucy
Savage
Scandalized
Scared
Scornful
Scrupulous
Seasoned
Seclusive
Secondary
Secretive
Secure
Sedate
Sedated
Seduced
Seductive
Seedy
Self-absorbed
Self-assured
Self-centered
Self-collected
Self-complacent
Self-composed
Self-confident
Self-conscious
Self-contained
Self-critical

Self-deprecatory
Self-effacing
Self-important
Self-indulgent
Selfish
Selfless
Self-pitying
Self-possessed
Self-reliant
Self-restrained
Self-righteous
Self-satisfied
Self-sufficient
Self-willed
Senseless
Sensible
Sensitive
Sensual
Sensuous
Sentimental
Serene
Serious
Serious-minded
Servile
Set right
Set straight
Settled
Sexual
Sexy
Shabby
Shackled
Shaken
Shaky
Shamed
Shamefaced
Shameless
Shapeless
Sharp
Sharp-tempered
Shattered
Sheepish
Shelved
Shiftless
Shivery
Shocked
Shrewd
Shy
Sick
Sick at heart
Sickened
Silenced
Silly
Simple
Simple-headed
Simple-minded
Simple-witted
Sincere
Sinful
Single-minded
Singular
Sissyish
Skeptical
Skilled
Skillful
Skittish
Slack
Slavish
Sleepy
Slighted
Sloppy
Slothful
Slovenly
Slow
Sluggish
Slumberous
Slumbery
Sly
Small

Small-minded
Smart
Smashed
Smothered
Smug
Smutty
Snappy
Sneaky
Snippy
Snobbish
Snooty
Snubbed
Sober
Sober-minded
Sociable
Social
Soft
Softhearted
Solemn
Solicitous
Solid
Solitary
Somber
Somnolent
Soothed
Sophisticated
Sophomoric
Soporific
Sore
Sore at heart
Sorrow-burdened
Sorrowful
Sorrow-laden
Sorrow-stricken
Sorrow-worn
Sorry
Spectacular
Speculative
Spellbound
Spineless
Spirited
Spiritless
Spiteful
Spleenful
Splendid
Spoiled
Spontaneous
Sportful
Sportive
Sprightly
Spry
Spunky
Spurned
Spurred
Squalid
Squeamish
Squelched
Stable
Staggered
Stagnant
Staid
Stalwart
Standoffish
Startled
Starved
Stately
Steadfast
Steady
Stealthy
Sterile
Sterling
Stern
Stiff
Stifled
Stimulated
Stingy
Stirred
Stoical

Stolid
Stony
Stopped
Stormy
Stout
Stouthearted
Strait-jacketed
Strange
Strengthened
Strict
Strong
Stubborn
Studious
Stunned
Stupefied
Stupendous
Stupid
Stuporous
Sturdy
Stymied
Suave
Subdued
Subjective
Sublime
Submissive
Subordinate
Subserviant
Suffering
Suffocated
Sulky
Sullen
Sunk
Sunny
Superb
Supercilious
Superior
Supported
Suppressed
Sure
Surfeited
Surly
Surprised
Suspicious
Sustained
Swamped
Sweet
Swell
Swollen
Sympathetic
Systematic
Tacky
Taciturn
Tactless
Taken aback
Talkative
Tame
Tardy
Temperamental
Temperate
Tempestuous
Tenacious
Tender
Tenderhearted
Tense
Terrible
Terrified
Terrorized
Testy
Tethered
Thankful
Thick
Thickbrained
Thickheaded
Thickpated
Thin-skinned
Thick-witted
Thirsty
Thoroughgoing

Thoughtful
Thoughtless
Thrashed
Thrilled
Thuggish
Thunderstruck
Thwarted
Tickled
Tickly
Tight
Tightfisted
Tight-lipped
Timid
Timorous
Tingly
Tipsy
Tired
Titillated
Tolerant
Tormented
Torpid
Tortured
Tottery
Touched
Touchy
Tough
Tragic
Trammeled
Tranquil
Transfixed
Transported
Treasured
Trembly
Tremendous
Tremulous
Trim
Triumphant
Troubled
True
Trustful
Turbulent
Tyrannical
Tyrannized
Ugly
Umbrageous
Unacceptable
Unadventurous
Unaffected
Unaffectionate
Unafraid
Unagitated
Unalarmed
Unamiable
Unamicable
Unanxious
Unappealing
Unappeasable
Unappeased
Unapprehensive
Unappreciative
Unapproachable
Unassuaged
Unassuming
Unassured
Unattended to
Unattractive
Unbalanced
Unbeaten
Unbelieving
Unbellicose
Unbelligerent
Unbending
Unbiased
Unblessed
Unblissful
Unbowed
Unbridled
Uncalculating

Uncalm
Uncared for
Uncaring
Uncertain
Uncharitable
Uncheerful
Unclean
Uncomfortable
Uncommunicative
Uncompanionable
Uncomplacent
Uncomplaisant
Uncompleted
Uncompromising
Unconcerned
Unconfident
Uncongenial
Unconquerable
Unconsolable
Unconstrained
Uncontented
Uncontent
Uncontrollable
Uncordial
Unctuous
Uncultivated
Uncurbed
Undaunted
Undeceived
Undecided
Undefeatable
Undefeated
Undemonstrative
Underfed
Undernourished
Understanding
Undeserving
Undesirable
Undisciplined
Undistracted
Undistressed
Undisturbed
Uneasy
Unecstatic
Uneffusive
Unemotional
Unequal
Unesthetic
Unexcited
Unexhausted
Unfaltering
Unfinished
Unfit
Unflurried
Unflustered
Unfluttered
Unforced
Unforgiving
Unfortunate
Unfriendly
Unfrightened
Unfruitful
Unfulfilled
Ungainly
Ungenerous
Unglad
Ungleeful
Ungodly
Ungovernable
Ungraceful
Ungracious
Ungrateful
Ungratified
Ungrudging
Unguarded
Unhandy
Unhappy
Unharmed

Unheeded
Unhinged
Unholy
Unhurried
Unimportant
Unimpressed
Uninclined
Uninebriated
Uninhibited
Unintelligent
Uninterested
Unintoxicated
Uninviting
Unjoyful
Unjoyous
Unkempt
Unkind
Unlikable
Unlimited
Unlovely
Unlucky
Unmanly
Unmanned
Unmerciful
Unmeritorious
Unmilitant
Unmindful
Unmoved
Unnatural
Unneighborly
Unnerved
Unnotable
Unobtrusive
Unostentatious
Unperturbed
Unpleasant
Unpleased
Unpleasing
Unpoised
Unpolished
Unpositive
Unpracticed
Unprejudiced
Unprepared
Unpresentable
Unpressured
Unpresumptuous
Unpretentious
Unproductive
Unprotected
Unprovided for
Unpugnacious
Unqualified
Unquenchable
Unquiet
Unrattled
Unrefined
Unrelenting
Unreliable
Unrepentant
Unrepented
Unrepressed
Unreserved
Unresponsive
Unrestrainable
Unrestrained
Unrestricted
Unrivaled
Unruffled
Unrushed
Unsated
Unsatisfied
Unscared
Unscathed
Unseasoned
Unself-assured
Unself-confident
Unselfconscious

Unselfish
Unseemly
Unsettled
Unshrinking
Unsightly
Unskillful
Unslaked
Unsociable
Unsocial
Unsophisticated
Unsparing
Unspent
Unstable
Unsteady
Unstinting
Unstirred
Unstrung
Unsuccessful
Unsuitable
Unsuited
Unsuppressed
Unsure
Untactful
Unterrified
Unthankful
Unthinking
Untidy
Untouched
Untrained
Untried
Untroubled
Unusual
Unvanquished
Unvirile
Unwary
Unwavering
Unwearied
Unworldly
Unworried
Unworthy
Upheld
Upset
Urbane
Urged
Useful
Useless
Vacant
Vacillating
Vacillatory
Vacuous
Vain
Vainglorious
Valiant
Valorous
Valuable
Valued
Valueless
Vanquished
Vapid
Vaunting
Vehement
Venerated
Vengeful
Venomous
Venturesome
Verdant
Vexacious
Vexed
Vibrant
Vicious
Victorious
Vigilant
Vigorous
Vile
Vilified
Villainous
Vindictive
Vinegary

Violated
Violent
Virile
Vital
Vitalized
Vitriolic
Vivacious
Vivified
Void
Voracious
Vulgar
Vulnerable
Vulturous
Waggish
Wakeful
Wanted
Wanting
Warm
Warmhearted
Wary
Washed-out
Wasted
Watchful
Wavering
Wavery
Wayward
Weak
Weak-kneed
Weak-minded
Wealthy
Weary
Weird
Welcome
Well
Well-balanced
Well-behaved
Well-content
Well-disposed
Well-fed
Well-nourished
Well-received
Well-regarded
Well-satisfied
Wheedled
Whiny
Whimsical
Whipped
Whole
Wicked
Wide-awake
Wild
Willful
Willing
Wilted
Winsome
Wishful
Wistful
Withdrawn
Witless
Witty
Wobbly
Woeful
Woe-laden
Woe-stricken
Womanish
Wonderful
Wondering
Wooden
Worked up
Work-oriented
Worldly
Worried
Worrying
Worshiped
Worshipful
Worthless
Worthy
Wounded

Wrecked	Wrought up	Youthful
Wretched	Yielding	Zealous
Wrong	Young	

APPENDIX B

INSTRUCTIONS FOR EMPIRICAL SELECTION OF ADJECTIVES DENOTING FEELINGS

ASPECTS OF A PERSON

Introduction

[Read the introduction to yourself as the experimenter reads it aloud.]

The Underground Man

"I am a sick man . . . I am a spiteful man. I am an unattractive man. I believe my liver is diseased. However, I know nothing at all about my disease, and do not know for certain what ails me. I don't consult a doctor for it, and never have, though I have a respect for medicine and doctors. Besides, I am extremely superstitious, sufficiently so to respect medicine, anyway (I am well-educated enough not to be superstitious, but I am superstitious). No, I refuse to consult a doctor from spite, That you probably will not understand. Well, I understand it, though. Of course, I can't explain who it is precisely that I am mortifying in this case by my spite: I am perfectly well aware that I cannot "pay out" the doctors by not consulting them; I know better than any one that by all this I am only injuring myself and no one else. But still, if I don't consult a doctor it is from spite. My liver is bad, well--let it get worse!" (p. 25)

Dostoyevsky, F. Notes from the underground. New York: Dell Publishing Company, Inc., 1960.

Words help us to come to know a person. They focus our attention on how he acts, what he is like, and what he feels. Some words seem to apply primarily to how a person acts. In the above passage superstitious describes how Dostoyevsky's underground man acts. Other words seem to apply to what a person is like. In the above passage sick, unattractive, and well-educated tell us what the underground man is like. Still other words describe what a person feels. In the above passage spiteful indicates what the underground man feels.

In this experiment, you will be a judge. You are to decide which aspect of a person each word in the list below applies to most: how he acts? what he is like? what he feels? These aspects of a person could be called BEHAVIOR (BH), PERSONALITY (PS), and FEELINGS (FL). For each word, you are to decide the aspect to which it most applies.

Consider the word loud. When used to describe a person, it seems most to apply to his behavior--how he acts. We might infer that the person speaks loudly or generally makes alot of noise.

Consider the word trustworthy. When used to describe a person, it seems most to apply to his personality--what he is like. We might infer that an important fact about the person is that he can be trusted by others.

Consider the word happy. When used to describe a person, it seems most to apply to his feelings. We might

infer that the person is in a state of psychological well-being.

For each of the words on the list below you are to circle the aspect--BH (BEHAVIOR), PS (PERSONALITY), FL (FEELINGS)--to which the word most applies. Does the word focus our attention on how a person acts, what a person is like, or what a person feels?

Complete the following examples. When you have finished, look up.

HAPPY	BH	PS	FL
TRUSTWORTHY	PS	FL	BH
LOUD	FL	BH	PS
IDEALISTIC	BH	FL	PS
ANGRY	PS	BH	FL
SLOW	FL	PS	BH

If you judged idealistic to apply most to PERSONALITY, you should have circled PS. If you judged angry to apply most to FEELINGS, you should have circled FL. If you judged slow to apply most to BEHAVIOR, you should have circled BH.

It is likely that some of the words you are to judge will be unfamiliar to you. When you don't know a word circle DK for DON'T KNOW: FL DK BH PS.

It is also likely that some words will not seem to apply to BEHAVIOR, PERSONALITY, or FEELINGS. When you don't know to which aspect of a person the word applies, circle DK for DON'T KNOW: DK PS BH FL.

Your task as a judge in this experiment is to decide

which aspect of a person each word in the list below applies to most:

BH BEHAVIOR: how a person acts
PS PERSONALITY: what a person is like
FL FEELINGS: what a person feels

Your best judgments are likely to come in the first few seconds after reading a word, so don't think too long before deciding.

If you have any questions at this point, please raise your hand.

The experiment should take about 40 minutes. When you have finished, bring your judgments to the front.

APPENDIX C

INDIVIDUAL DIFFERENCES MULTIDIMENSIONAL SCALING

INDIVIDUAL DIFFERENCES MULTIDIMENSIONAL SCALING

The Individual Differences Multidimensional Scaling (INDSCAL) method, developed by J. D. Carroll and J. J. Chang (1970), is a multidimensional scaling (MDS) method as contrasted with factor analytic methods and has many of the characteristics of other MDS methods. The basic assumption of INDSCAL and many MDS methods is that the perceived similarity between pairs of stimuli is linearly related to distance in a latent psychological space. Stimuli appear as points in that space, with the dimensions being interpreted as equal interval scales of the latent attributes of the stimuli. Where factor analytic methods deal with the covariance between variables, INDSCAL and MDS methods deal with distances between stimuli.

INDSCAL also assumes with many MDS methods that distances in the latent psychological space are Euclidean: that is, they can be expressed by the usual formula from analytic geometry for the distance between two points. It differs from other MDS methods by allowing for individual differences in perception. With INDSCAL, subjects are assumed to differ in the importance they give to the dimensions of the psychological space: in mathematical terms, they weight the dimensions differentially. INDSCAL solves simultaneously for the latent psychological space of stimuli and for subject weights.

The basic equation or model of the INDSCAL method is the following modification of the Euclidean distance formula:

$$d_{jk}^{(i)} = \sqrt{\sum_{t=1}^{r} w_t^{(i)} (x_{tj} - x_{tk})^2} \quad ,$$

where $d_{jk}^{(i)}$ is the distance between stimuli j and k in the latent psychological space of individual i, $w_t^{(i)}$ is the weight given by subject i to dimension t, x_{tj} and x_{tk} are the scale values of stimuli j and k respectively on dimension t, and r is the dimensionality of the space.

Unlike other MDS methods or factor analytic methods, INDSCAL determines positions for its dimensions which are unique. Fitting the above model to experimental data by least squares procedures defines an orientation of the dimensions which accounts for a maximum amount of the variance. Any rotation reduces this variance. Interpretively this means that the latent attributes of the psychological space characterize both stimuli and subjects. Differences between stimuli establish their relationships to each other in the psychological space; differences between subjects' perceptions of these relationships establish the orientation of the dimensions and consequently also the character of the latent attributes.

The INDSCAL solution for a stimulus space and a set of

subject weights begins by finding a constant which will transform relative distances (raw judgments of similarity) to absolute distances for each subject (Torgerson, 1958). As with most MDS methods, absolute distances are converted to scalar products with an origin at the centroid of the stimuli. The INDSCAL model in terms of scalar products becomes

$$s_{jk}^{(i)} = \sum_{t=1}^{r} w_t^{(i)} x_{tj} x_{tk} \quad ,$$

where $s_{jk}^{(i)}$ is the scalar product between vectors for stimuli j and k for individual i, all other symbols having the same meaning as before. Each subject's data is then normalized so that the sums of squares of scalar products is equal to 1. By an iterative process least squares estimates of scale values and subject weights are determined: beginning with arbitrary values, each parameter of the model is solved for in turn by holding the remaining parameters constant--a process which is repeated until only minimal improvement is possible in the solution. Latent roots and vectors are not used. The resulting multidimensional scale is normalized so that the mean of subject weights on each dimension is 1. (Carroll and Chang normalize the solution so that the sums of squares of scale values on each dimension is 1. The present procedure has

the advantage of preserving the natural variance of the stimulus dimensions.) The solution normalized in this way represents the latent psychological space of a hypothetical individual at the centroid of the distribution of subject weights.

APPENDIX D

INSTRUCTIONS FOR INDIVIDUAL DIFFERENCES MULTIDIMENSIONAL SCALING OF ADJECTIVES DENOTING FEELINGS

SIMILARITY OF FEELINGS

Introduction

Two things are similar or they are different. This is a simple but basic psychological fact. We all have learned to make judgments of similarity and difference. In this experiment you are to use this ability to judge the similarity or difference of pairs of feelings. How similar or different are they?

At the top of your answer sheet is a scale of similarity. By using it you will be able to express each judgment as a number from 0 - 9. As you can see 0 means "Identical, No Difference" and 9 means "Completely Different, No Similarity." These are extremes. The numbers 1 - 8 divide this range of similarity into <u>equal steps</u>. The closer the number is to 0 the more similarity it expresses; the closer the number is to 9, the more difference it expresses. Each box on your answer sheet corresponds to a pair of feelings. You are to record your judgments in these boxes.

Your task in this experiment is to judge the similarity or difference of pairs of feelings. How similar or different are they? Consider each pair of feelings, decide how similar or different they seem to be, and record your judgment as a number in the box on your answer sheet.

You have 40 minutes in which to work. This means that after the first few judgments, which may take longer, you

should spend no more than 15 seconds on each.

If you have any questions at this point please raise your hand.

VITA

VITA

LYNN ELLISON BUSH II

Born Pasadena, California, March 9, 1942
Married 1966; no children

Educational History

1968	M.A., Louisiana State University, Clinical Psychology
1965-66	Study, Southern California School of Theology at Claremont, Pastoral Counseling
1963	A.B., Pomona College, English (creative writing)

Professional Experience

1969-70	Internship: South Shore Mental Health Center, Quincy, Massachusetts
1968	Part-time employment with supervision at Hammond State School for the Mentally Retarded, Hammond, Louisiana
1966-69	Veterans Administration Traineeship with summers at Veterans Administration Hospitals in Boston, Massachusetts, Houston, Texas, and Gulfport, Mississippi
1966-67	Teaching Assistantship, Louisiana State University

Honors

1971	Elected to Phi Kappa Phi, Louisiana State University
1970-71	Dissertation Fellowship, Louisiana State University

Organizational Membership

1971	Associate, Sigma Xi
1971	Student in Training, Southwest Institute for Personal and Organizational Development
1969-71	Associate, American Psychological Association

EXAMINATION AND THESIS REPORT

Candidate: Lynn Ellison Bush, IInd.

Major Field: Clinical Psychology

Title of Thesis: Empirical Selection and Individual Differences Multidimensional Scaling of Adjectives Denoting Feelings

Approved:

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

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Date of Examination:

July 19, 1971